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The

Geographical Journal.

No. 1. JULY, 1894. Vol. IV.

ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY.*

By CLEMENTS R. MARKHAM, C.B., F.R.S., President.

In delivering my anniversary address for the first time as your President, it is with a feeling of intense satisfaction that I am able to do so after all old wounds have been permanently healed over, and after perfect harmony has been restored in the Society. It was found last year that the rules did not all work so as to give complete satisfaction either to the Council or to the rest of the Fellows, and some deplorable friction was the result. This has now been remedied. The privileges and rights intended to be enjoyed by the Fellows under the charter have been fully and clearly secured to them by the rules; all possibility of contentious discussion and debate has been entirely banished for the future from our anniversary meetings; and special general meetings will not be called without more ample notice than has hitherto been given, while requisitions for them will be made, and resolutions will be passed by a more adequate number of Fellows. These alterations in the rules were called for by the general sense of the Fellows. They have removed all feeling of dissatisfaction that lingered amongst us. It will be my aim, as your President, to maintain the harmony which happily now exists by keeping the Fellows acquainted with the decisions of the Council affecting the well-being of the Society, and by using every effort to prevent friction, and to promote, and if possible to increase, the interest taken in the Society's work by the individuals who compose it.

I have long entertained the idea that these desirable objects might be secured, among other ways, by a plan which, with much help and advice from members of the Council and from the Society's staff, is now nearly matured. I have drawn up a list of all the Fellows who have written papers for our Proceedings or Journal, or have published books, or are known to have a special knowledge of one or more departments of our science, and to this list additions have been made by others. For the present I have called it a List of Referees, because papers or questions can advantageously be referred for report to any of the Fellows contained in the list, as regards their special subject or subjects. It is divided into two parts, the first being an alphabetical list of names with the subjects respecting which each is an expert; and the second being arranged according to countries and subjects. It will be sent to many Fellows of the Society for suggestions and additions, and, when tolerably complete, it will probably include several hundred names. Some Fellows are collectors of geographical books or maps. Others may have a profound knowledge of particular regions, or of special departments of our work, who have never published anything. The referees may have papers referred to them, may become members of committees on questions relating to their special subjects, and would, no doubt, be ready to give information and advice to inquirers, while the Council will be mainly recruited from them. The existence, and eventual publication, of the List of Referees will be of use to the general body of Fellows in various ways. Taking a more general interest in geographical subjects, the elders will thus be informed whither to go for information on points that occupy their attention, while it will be the ambition of younger members to qualify themselves for inclusion in the list. In various ways I confidently hope that the plan will have the desired tendency of drawing the Fellows more together, and into nearer touch with the Council.

---

* Delivered at the Anniversary Meeting, May 28th, 1894.

Another measure, which I anticipate will have a similar effect, will be to offer more inducements to study and make use of the great store of geographical information in our library, by the completion of the catalogues, and by giving greater convenience and more comfort to readers. The present alphabetical catalogue was made in 1865, and there have been two supplements in 1870 and 1880. But in 1893 it was decided to recast the whole catalogue, including the three supplements (for a third up to 1890 had been prepared and was ready for printing), and to make one continuous alphabetical catalogue, printed in smaller type than previously and in double column, and brought down to 1893. It is now all in print. There will be two Appendices, the first containing an alphabetical list of all the collections of voyages and travels, with an analytical table of contents to each volume, which is also in type. The second Appendix is devoted to anonymous and periodical literature arranged in geographical order. The catalogues have been made under the control and superintendence of Dr. Mill. The assistant in the library, Mr. Vincent Hawkins, deserves great credit for his industry and diligence, and Dr. Murie has now put the series of periodicals into perfect order, making a list of all deficiencies; but the second Appendix is not yet finished. The authors' catalogue will, however, be in the hands of the Fellows in the course of the present year.

A subject catalogue was prepared by Mr. Godfrey Evans in 1871, and was extremely useful, but it now contains less than half the books in the library. In 1892 it was, therefore, resolved that a new and exhaustive subject catalogue should be prepared, and the services of Dr. Murie were secured, to work at it under the control of Dr. Mill. He has since given the Society the benefit of his remarkably wide knowledge of geography and travel, and of his rare perseverance and organizing ability. The three essentials of this catalogue are that it is to be exhaustive, systematic, and exclusively geographical, many works in the library that are not geographical appearing only in the authors' catalogue. A subject catalogue fulfilling these conditions will be an invaluable contribution to geography, serving as a guide to all workers in all parts of the world, as well as rendering the contents of the library accessible to Fellows. It involves enormous labour. All the titles of books and pamphlets in the printed catalogues, numbering 18,000, have been cut out and classified; and all transactions and periodicals have been rearranged. Dr. Murie calculates that the number of titles of papers in periodicals will amount to 84,000; so that the complete catalogue will comprise about 110,000 titles, occupying 5000 octavo pages of print. Dr. Murie is now put upon his metal to complete the work in not more than two years.

Dr. Mill gave a new form to the bibliography in the Journal when it was commenced last year. It was made to include not only books and separate pamphlets, but all the longer geographical papers which appeared in the periodicals received in the library. Thus an analysis of current geographical work is presented each month. From these notices a subject card catalogue has been compiled since June, 1892, divided into continents and subdivided into countries and provinces, the arrangement being assisted by the use of differently coloured cards. As it is kept up to date, this card catalogue forms an appendix to the great subject catalogue.

As soon as the alphabetical catalogue is finished, I intend to establish two *desiderata* books—one for Fellows to enter any book they may have asked for, which is not in the library; and the other to contain a complete list of works which are wanting to make our library perfect.

I am very anxious that the accommodation for readers should be improved, and that they should be made more comfortable, in order that their numbers may increase, and that more use may be made of the library. Several suggestions have been made with this object in view from time to time; and now the question of either improving and enlarging the accommodation in our present house, or of buying other premises, is occupying the very serious attention of the Council. Momentous financial and other questions are involved, and the subject is one which calls for most careful consideration. It will not be decided hurriedly, and no irremediable step will be taken without the consent of the Fellows of the Society assembled at a special general meeting. At the same time a final decision is rather pressing, as all the work is kept in an unsettled state until it is known whether we are to remain in our present house or to go elsewhere. For instance, the press marking of the books in the library cannot be proceeded with until it is known on what shelves they are to rest. The Fellows may be assured that our deliberations will be full and mature, that we shall seek the best advice, and that our final decision on this subject will be the best that can be made under the very difficult circumstances, when there are so many things for and against any course we can adopt.

The *Geographical Journal*, in its present form, has now completed the first eighteen months of its existence, and we may claim for it that it has more than fulfilled the expectations that were entertained of it. We now receive every month the papers read at our evening meetings, with good and original maps, with the discussions and often with illustrations, papers on scientific and on applied geography, carefully selected and classified notes on matters of general geographical interest, notices of the literature and cartography of the month, obituaries, and news. I find that already our Journal has attained a fair share of success. The sale to the outside public has increased considerably, and the importance of our publication may be gauged, to some extent, from the fact that the advertisements have increased from four to an average of twenty-two pages. This is important, because it helps the Journal, in its new form, to pay for the expense of its production. The fact that it is quoted everywhere, at home and abroad, may be taken as a sign that it has already been recognized as the leading organ of geography, at least in the English language. From the beginning it has been favourably noticed by the principal organs of the press. But I consider that the most gratifying testimony to the enterprise of our Society in this and other directions is contained in a letter from the celebrated traveller and geographer, Baron von Richthofen. "Will you allow me," he wrote, "to make use of this opportunity for congratulating you on the excellent character of the *Geographical Journal?*" As far as our means permit, we shall endeavour to improve its character and attractions. We have subscribers, outside the Society, in all parts of the world, in remote towns in the United States, and in Australia; and steps will be taken to bring the Journal under the notice of hundreds likely to be interested in it, both in America and the Colonies. The size of our publication will probably have to be increased before long; for even with the extra pages which have been added, our accomplished Editor finds it increasingly difficult to keep pace with geographical activity in all departments and in all parts of the world.

We thus have, in our Journal every month, a very complete review of geographical proceedings throughout the world, and every six months six journals are presented to us with an index. The review of these Proceedings, which it has been customary for former Presidents to give in their annual addresses, has therefore become unnecessary, for the Fellows will already be in possession of such a review, and another recapitulation is neither useful as information nor serviceable for future reference. It is work already well done. It seems desirable, therefore, as likely to be more interesting to the Fellows, that the main part of the address should in future dwell upon some particular subject, preferably one that has most engaged the attention of geographers during the past year.

I freely acknowledge that the omission of a detailed review of the progress of geography will be quite a new departure, for such a review has annually been given since the foundation of the Society. For many years it was essential, because the information could not be found elsewhere, and for a long time it was very useful; but as it has now become unnecessary, owing to the improved character of our Journal, the time for a change, in the place of the annual address, seems to have arrived. During the first eight years of our existence, the reviews of geographical progress were written by our indefatigable naval secretaries, Captains Maconochie and Washington. But in 1838 my accomplished predecessor, Mr. W. R. Hamilton, introduced the practice of delivering annual Presidential Addresses, which has ever since prevailed. Since 1838 there have only been three occasions on which the annual address has not been written and delivered by the President. In 1861 Sir Roderick Murchison, as Vice-President, delivered the address in the absence of Lord Ashburton; in 1879 I delivered the address as Secretary, owing to the absence of Lord Dufferin; and the illness of Lord Aberdare made it necessary for General Strachey to deliver the address in 1886. It was the custom for the obituaries, which now appear in the different numbers of the Journal, to be collected in the address; and there was a detailed review of work done during the year. I may observe that the address was always entitled "Address to the Royal Geographical Society by the President," from 1838 to 1878. In 1879 I prepared a statement of the progress of geography during the year, in lieu of a President's address, and ever since my title has been adopted, and the President's address has been called "The Annual Address on the Progress of Geography." But that title was not intended for the President's Address. I now propose to revert to the older and more convenient title, "Address to the Society by the President," leaving each President freedom to choose his own subject-matter.

For it was not the plan of Mr. Hamilton that the addresses should be confined to obituaries and reviews of current work, as has generally been the case in recent times. He and his immediate successors, while following the established practice, also dwelt upon some special subject in the body of their addresses. In 1838 Mr. Hamilton discoursed on the importance of geography, and on the uses of the Society; and in 1839 his great numismatic knowledge enabled him to offer some most interesting suggestions respecting our medals. Mr. Greenough occupied his address with a treatise on map-drawing and an improved system of mapping. Admiral Smyth dwelt on the duties of the Society, and on the definition and scope of geography. Sir Roderick Murchison made it a regular practice to select some subject of interest as the principal feature or kernel of his addresses. In 1844 this was the Ural mountains and the gold-produce of Russia. In 1852 he sketched out, with a master hand, the geographical features of the African continent. Oceanography, suggested by Maury's charming work, was the subject of Sir Roderick's address in 1853. In 1857 he stirred his audience to enthusiasm by his advocacy of a final Arctic search; and in the following year he dwelt on changes of the Earth's surface. Earthquakes were his subject in 1859, the former condition of Europe in 1863, and glaciers in 1864. In 1865 he reviewed the work remaining to be done in all parts of the world. The address of 1867 was devoted to the Aralo-Caspian Basin, and Sir Roderick's later addresses were occupied with the connection of geography with geology. After Sir Roderick's time the practice of giving a kernel to the Presidential addresses was abandoned, until in 1888 General Strachey touched upon the legitimate limits of geography, and in 1889, on the occupation of the waste spaces and on the supremacy of civilized races.

The idea of devoting the bulk of the Presidential Address to one special subject of interest is not, therefore, an innovation, for it was the almost invariable practice of Sir Roderick, and had been occasionally adopted before his time. As the ordinary subject of former addresses is now adequately provided for every month in the Journal, a mere recapitulation can serve no useful purpose. The fare that should now be served up to the Fellows is a kernel in imitation of Sir Roderick's *menu*, with such garnishing as time and circumstance may suggest, and as each President may think desirable. Such is my ideal of the Presidential Address of the future; but I am unable to entertain the hope that I can make even an approach to its realization. I will, however, take this opportunity of dwelling upon the subjects which have chiefly occupied geographers during the past year, namely, the promotion of further discovery both in the Arctic and the Antarctic Regions.

No less than six expeditions have either been projected or undertaken to explore different parts of the Arctic Regions within the last two years, so that the subject has necessarily occupied a large share of our attention. It is one that has been before this Society since its foundation, and some of the most important Government expeditions, including that of Sir George Nares in 1875, were due to the initiative of our Council. In the long period, during which Arctic work has been over and over again under the special consideration of the Council, and of Committees appointed by it, consisting of men of science and of varied Arctic experience, distinct canons of exploration have been laid down, and opinions have been formulated which will certainly be useful for our guidance in the future. The Council has always consistently maintained that merely to reach the North Pole, or to attain a higher latitude than some one else, were objects unworthy of support. In our view, the objects of Arctic exploration are to secure useful scientific results: in geography, by exploring the coast-lines and interiors, and by ascertaining the conditions of land and sea within the unknown area; in geology, by observations and collections; in zoology and botany; and in physics, by a complete series of observations, extending over at least a year. I well remember that when, in 1874, we were preparing the memorandum on the scientific results of Arctic work, General Strachey added another consideration. It may be shown, he said, that no such extent of unknown area, in any part of the world, ever failed to yield results of practical as well as of purely scientific value; and it may safely be urged that, as it is mathematically certain that the area exists, it is impossible that its examination can fail to add largely to the sum of human knowledge.

The unknown area remains very much as it was left when these words were written in 1874, except that the expedition of Sir George Nares, in the two following years, discovered the trend of the land on the eastern and western sides of Robeson Channel, the great extent of the sea of ancient ice, and brought back valuable collections and observations in all branches of science. We are still ignorant of the region to the north of Siberia. The northern, western, and eastern sides of the archipelago of Franz Josef Land have yet to be explored. The problem is still unsolved whether there is land due north of Spitzbergen. We have yet to hear whether the outline of Greenland has been completed. Ellesmere Land is almost entirely unknown, as well as the important and interesting region leading from Jones Sound. The whole vast region between Prince Patrick Island and Siberia, the exploration of which will lead to such important results in physical geography, is also unknown. The whole of this work can only be accomplished gradually, and one expedition will have to follow another until all the knowledge attainable in this field of inquiry has been secured.

For achieving success we have held certain canons, the correctness of which has been confirmed by all experience. It is true that they may be neglected on rare occasions without fatal consequences, but this can very seldom be done with impunity. The first great lesson taught by two centuries of experience is that no extensive and useful exploring work can be calculated upon by merely entering the drifting pack. Secure progress can only be made by following a coast-line. The second canon is that at least one winter must be passed at a point beyond any hitherto reached. This is essential in order to obtain series of meteorological and magnetic observations of any value. The third rule is that a ship, not a hut on shore, must be looked upon as the proper base of operations, sledges being the main instruments for exploration and discovery. Thoroughly good work, including complete series of observations of all kinds, can only be secured by the appliances and resources of well-equipped Government expeditions. When the conviction of the importance of that part of the duty of a Government is absent, which is unfortunately the case during long intervals, private enterprise has always been ready to enter the breach, though with inferior resources, and therefore at greater risk. The commander of an Arctic expedition ought to be a man of high scientific attainments, of great experience in the ice, and known to be gifted with the rare qualifications of a leader of men. Such a commander is seldom to be found except in the service of a Government with a wide range of selection. When the circumstances and qualifications that we would desire to secure are unattainable, then we gladly welcome the nearest approach to them. Enterprise, however contrary to rule and however audacious, should ever be encouraged and cheered onwards. When there are only small resources, risks must be run and attempts must be made which could not be approved under other circumstances. We shall always admire and applaud the enthusiasm and temerity of those who make attempts to open geographical secrets by private enterprise and with inadequate means. It is under such conditions that the projects have been conceived, and in some cases matured, which have engaged our attention in the Arctic Regions during the last two years. The merit of the work that may be achieved will be immensely enhanced by the special difficulties arising from different causes in each case, but all increasing the risk and the glory.

In Nansen the expedition to the north of Siberia has the unusual advantage of having a commander of high scientific attainments, considerable Arctic experience, and the rare gift of inspiring confidence among his followers. As is well known, his guiding idea is that, as all previous expeditions have been stopped by the ice drifting south, he would not be stopped if he entered the Arctic Regions in the ice stream drifting north. He thus discards our chief Arctic canon, which is that progress should always be made along a coast-line; but the application of that rule has always been to ice drifting in a direction contrary to the course of the ship. It seems very doubtful whether the initial force of the current on the Siberian side of the Polar sea will be sufficient to carry the *Fram* into the strong stream which undoubtedly flows south between Spitzbergen and Greenland. Her drift, however, may be in the direction that is anticipated by her sanguine and very able commander, and it is almost certain that there is an ice-laden channel, unobstructed by extensive land. We have no intelligence of the expedition having reached the neighbourhood of the mouth of the Lena, and it is possible that the *Fram* may have been beset in rounding Cape Chelyuskin, or even earlier. In that case it is likely that land will be discovered, which will certainly diminish the dangers of the pack. Wilczek Land may extend for a great distance to the east. The water to the east and west of the most northern point of Siberia is deeper than that directly to the north, which seems to indicate the existence of land north of Cape Chelyuskin, and it is not unlikely that the *Fram* will have fallen in with it. In that case Nansen will doubtless seek its northern limit, and thence endeavour to get into the northerly drift. Under any circumstances, he is sure to accomplish a great deal of valuable scientific work, and to make important discoveries. Of that we may be quite confident; and I am glad to think that Nansen concurs in the maxim of our Council, that the principal aim of Arctic voyages should be to explore the unknown regions, and not merely to reach the Pole. Lieutenant Weyprecht writes even more strongly. "The key to many secrets of nature," he says, "the search for which has now been carried on for centuries, is certainly to be sought for near the Poles. But as long as Polar expeditions are looked upon merely as a sort of international steeplechase, and their main object is to exceed by a few miles the latitude reached by a predecessor, those mysteries will remain unsolved."

The scene of Weyprecht's scientific observations, and of Payer's interesting and ably conducted sledge-journey, was Franz Josef Land, which is certainly the most promising starting-point for further discovery. This land, discovered by the Austrian expedition in 1872, consists of an archipelago, the southern shores of which are as far north as 80°, while the most northern land seen is in 83°. It will be remembered that Franz Josef Land consists, besides smaller islands, of two masses of land of sufficient extent to bear discharging glaciers sending forth flat-topped icebergs, which apparently drift northwards. Between these two masses, called Zichy and Wilczek Lands, is the channel named Austria Sound, which was explored for a considerable distance by Payer in the months of March and April, by means of sledges drawn by men, assisted by three dogs. All the low islands, as well as the main masses of land, were found to be covered by glacial caps. The remarkable fact connected with this journey is that, from Payer's furthest point in 82° 5′ N., a water sky made its appearance in the north, the temperature rose, and the rocks were covered with thousands of auks and guillemots. From a height Payer looked down on a dark sheet of open water dotted with icebergs. On April 12 the thermometer was at 54° Fahr. These phenomena so early in the year are most exceptional, and point to an abnormal condition of things, the causes of which it would be of the utmost importance to discover. Possibly they betoken the navigability of the Polar sea in this direction at certain seasons, although it is true that Payer's open water was only a "polynia," and was surrounded by old ice. In 1880 Mr. Leigh Smith, in the *Eira*, reached the southern shore of Franz Josef Land, and succeeded in rounding the western headland, whence the land trended in a north-westerly direction.

Judging from the birds and open water in 82° N. as early as the month of April, and from the success of Mr. Leigh Smith's voyage in 1880, it was considered by all who were capable, from their Arctic experience, of forming a judgment, that the proper way to explore the northern part of the Franz Josef Archipelago would be by despatching a well-equipped vessel along the western coast. It was the maxim of the Baffin's Bay whalers to "stick to the land floe," and to this Sherard Osborn added, "Stick to the western shore." I strongly advocated the despatch of such an expedition at a meeting of this Society on December 9, 1878, and my views were endorsed by several high Arctic authorities. A vessel well handled would certainly reach the threshold of the unknown, and would probably establish a base on the west shore of King Oscar or of Petermann lands, whence extensive and most important discoveries would be made in the spring. This, no doubt, is the most promising way of attempting the exploration of one of the most important sections of the unknown Polar region, and I believe that it will be undertaken the next time the British people wake up from their lethargy and become alive to the national importance of Arctic work. This happens about every thirty years.

Meanwhile we welcome the enterprise of Mr. Harmsworth and Mr. F. G. Jackson, which is directed towards the Austria Sound of Payer. It is highly to the credit of Mr. Harmsworth that he should have determined to provide the funds for a laudable geographical undertaking. It reminds one of the patriotic munificence of the merchant princes of old, and of Sir Felix Booth in more recent times. Mr. Jackson has made a voyage in a whaler, and last year he went out with Captain Wiggins to Waigats Island, where he was landed. He then made an excursion round the island with some Samoyeds, returning by Archangel; these sledge-journeys being undertaken in order that he might acquire experience for his future work. His plan is to be landed at Eira harbour, or at some other convenient point on the southern shore of the Franz Josef Archipelago. For this purpose a whaler named the *Windward* has been purchased. She will land the party of six men, and return without wintering. A house brought out in pieces will be erected, and the explorers will pass the winter in it, in order to be ready for a spring journey up Austria Sound in the footsteps of Payer. The chief drawback to the plan is that so much of the travelling will be over old ground already well explored by the Austrian expedition; so that the base of operations will be at least 160, and if at Eira harbour nearer 200 miles, from the point reached by Payer, where Mr. Jackson's work will commence. It does not appear how a second winter quarters can be established, with a sufficient stock of provisions, at the furthest point reached. It will therefore be necessary to return to the original base of operations, and to start again over all the same ground, in the second spring. A well-considered system of depôts would render this second journey more rapid if the explorers maintain their healths, and with a good team of dogs much ground might be covered. The most fortunate thing that could happen would be to find Austria Sound open, so that the *Windward* or a steam pinnace could convey the explorers northwards to within a shorter distance of their work. Austria Sound is not the route I should have recommended for reaching Petermann Land; but, with wise management and under favourable conditions of ice and weather, a good measure of success is quite possible. The Council is desirous of giving Mr. Jackson all the encouragement and assistance in its power, and we heartily wish him all the success that is attainable with the means at his disposal.

Westward the archipelago of Spitzbergen ends in the parallel where that of Franz Josef commences. It has long been a favourite idea with inexperienced theorists, that the pole might be reached by a ship shaping a northern course through the ice to the north of Spitzbergen. This idea transgresses the best established of our Arctic canons, which is never to enter the drifting pack away from land. But it occurred to Sir Edward Parry that, although the impracticability of sailing to the pole by the Spitzbergen route was sufficiently proved, the same object might be attained by travelling with sledges over the ice. Parry undertook this feat in 1827, with two flat-bottomed boats 20 feet long, with runners on each side of the keels shod with metal; so that the boat entirely rested on the runners when on the ice, and became a sledge. They started with seventy-one days' provisions, and on June 23 the boats were hauled on the ice in 81° 13′ N. The weight of each boat with provisions was 3753 lbs., or 268 lbs. per man, there being twelve men and two officers for each boat. The ice-floes were found to be of small extent, and intersected by high ridges of hummocks, the snow was soft and heavy, and there was much water lodged on the floes. But the southerly drift exceeded four miles a day; the advance north under such circumstances was hopeless, and Parry resolved to retrace his steps on July 23, when he was in 82° 45′ N. From this point there was a strong yellow ice-blink overspreading the northern horizon, and showing that the polar pack extended far to the northward. Parry's great mistake was in starting so late in the year. He ought to have been at least two months earlier. The daily allowance of food was insufficient, and the weight to be dragged, of 268 lbs. per man, was far too great.

Undoubtedly, if these errors were avoided, a much further advance to the northward might be made under favourable circumstances. The object of such an expedition would be to get further north than anybody else—"to beat the best record;" a motive which was so earnestly deprecated by Lieutenant Weyprecht, as the bane of good Arctic work. Still it is a sporting thing to attempt, and as those who are engaged in it will acquire valuable experience in the ice, it deserves every encouragement. Mr. Walter Wellman, a journalist of Washington, with funds amounting to £4000, has undertaken to make a renewed attempt to attain a very high latitude north of Spitzbergen, and has already started on his adventurous undertaking, with a few carefully chosen assistants. He is a capable and resolute man, and a thoroughly well-planned effort will be made under his auspices. He will land on Dane's Island, near the north-east angle of Spitzbergen, in the present month. Thence he will push northwards in aluminium boats of a new design, constructed at Baltimore, and weighing only 450 lbs. each. The boats are 18 feet long, 6 in beam, and 2 feet deep amidships, and are intended for a crew of nineteen men. They contain no frames, the gunwale, thwarts, knee-braces, and watertight compartments at either end giving the necessary rigidity; but too much rigidity is undesirable, elasticity serving to cushion the blows of the ice, and to transmit the force of the concussion through the whole structure. The keel is a plate of aluminium, and the plates are riveted together clinker-fashion, and are only a tenth of an inch thick. Two ash runners are fitted on the boat's bottom so as to convert it into a sledge, and a sheet of aluminium is riveted to the outer sides of both so as to form a broad surface for running on the snow or ice. It is doubtful how this kind of runner will work, but the lightness of the boats will be an incalculable advantage, and Mr. Wellman ought to advance far beyond Parry, especially if the dogs prove to be of use. If there are islands beyond 83° N. on the Spitzbergen meridians, and he is able to explore them, his expedition will be of great service to geography; but if not, very little benefit can be derived from a journey over the ice-floes in Parry's footsteps.

The enterprise of Lieutenant Robert E. Peary in Northern Greenland is of the greatest geographical importance. It is designed to solve the question of the insularity of Greenland—one of the oldest that remains for solution, and not the least interesting. It is a great achievement to put the finishing touch to the long tale of heroism and constancy which relates the discovery of the outline of that vast glacier-bearing island. The romantic story of the Norsemen is succeeded by the splendid work of Davis and Baffin, followed by the voyages of Ross, Inglefield, Kane, Hayes, Hall, and Nares, and by the sledge-journeys of Beaumont and Lockwood. These dauntless explorers completed what we know of the western side. On the east side the boat-journeys of Graah, Holm, and Ryder have been connected with the discoveries of Scoresby and Clavering, and the German expedition of Koldewey named the most northern point they saw on the east coast after Prince Bismarck. It is Peary's noble ambition to connect Cape Bismarck with the furthest point reached by Lockwood; and he resolved to make the attempt from the western side, by one of the most remarkable, if not the most remarkable journey ever made over an unbroken glacier.

Peary is a native of Maine, aged about forty, and an engineer in the United States navy. He is a man who appears to be cut out for such work, combining forethought and prudence in planning his operations, with great skill and the most undaunted resolution in carrying them into execution. His first expedition in 1891–92 was tentative, but it was a great success. He went out in the whaler *Kite*, and was landed in McCormick Bay in 77° 43′ N. on the northern side of Inglefield Gulf (the Whale Sound of Baffin), the party consisting of seven persons, including Mrs. Peary. Peary had his leg broken during the voyage, and was in a helpless condition when he was landed. His complete recovery was due in no small degree to the unremitting care of his wife. We must all feel the greatest admiration for the devotion of this lady, who braved the rigours of the Arctic regions, and was not only the life and soul of the winter quarters, but was throughout a most useful member of the expedition. The house was conceived and erected in a workmanlike manner, and in all Peary's operations there is the evidence of capacity and skill. He studied the questions of clothing, of provisions, and of sledge weights with great care and good working results. He also tried the different kinds of sledges before finally deciding that McClintock's pattern was the best. His journey occupied eighty-three days, from May 15 to August 6. The start was made with four sledges, four men, and dog teams, the depôt sledge with two men returning from Humboldt Glacier. Peary, with his companion Astrup, proceeded with three sledges and the dogs, and was travelling forty-eight days before reaching the northern edge of the great glacier, the actual marching time being forty days, and the distance covered 650 miles, or 16¼ miles a day. They had no depôts, and all the food was carried on the sledges, except two musk oxen and a calf shot on the north-east coast. The return journey of 600 miles occupied only twenty-eight days. Peary started with twenty dogs, reached his extreme point with fifteen, and returned with five. A good Eskimo dog will drag 100 lbs. at the rate of 10 to 20 miles a day.

It was found that, in approaching the edge of the glacier towards the north, the travellers got involved among numerous crevasses, causing endless trouble to circumvent them; so that it was advisable to keep on the plateau of the glacier. He reached the north-east coast of Greenland at a place which he named Independence Bay; and from the height called Navy Cliff he obtained an extensive view of lands to the northward with no ice caps, and therefore probably islands.

Peary returned home in September, 1892, and earned sufficient funds for his second expedition, by means of lectures and articles for the press. He had made a very thorough reconnaissance in 1891–92, by which he had tested all his equipments and got well acquainted with the nature of the country. He now resolved to proceed upon his final effort to complete the work he had set himself to achieve. He sailed in July, 1893, with a party numbering fourteen, including Mrs. Peary and her maid, with the intention of erecting the house in Bowdoin Bay, on the shores of Whale Sound. Peary's intention was to commence sledging operations in March, two months earlier than in 1892, and to make for Independence Bay by a route between the previous outward and return routes, so as to avoid the crevasses of the north-west, and the fogs of the higher plateau. Eight Mexican donkeys have been taken as an experiment and fitted with snow-shoes, as has been done with horses in Alaska. On reaching Independence Bay, it is intended to send one party southwards to Cape Bismarck, and the other northwards to connect with Lockwood's furthest. But it appears that Peary is also bitten with the "beating the best record" mania, and thinks of pushing due north with the object of reaching the highest latitude attainable. It is to be hoped that this fancy will not be allowed to mar the real work of the expedition, which is to complete the outline of Greenland.

Mr. Peary is again accompanied by the hardy young Norwegian, Eivind Astrup, who was with him throughout his first journey.

The *Falcon* steamer is to sail next June and proceed to Peary's quarters in Whale Sound; but it is not certain whether he will return or resolve to continue his work during another year. His decision will probably depend on the extent of his explorations this year, and on the amount of work he will have completed. We shall all look out for the particulars of his achievement with the deepest interest. For my own part, I look upon Peary as an ideal explorer. He chose one of the greatest and oldest of the geographical problems that remain to be solved, and he set to work as if he really intended to find the solution. Every detail of equipment was thoughtfully considered, gear was tried and tested before being used, a brilliant preliminary journey over the inland ice was made. All was done in the workmanlike style of a true discoverer. I therefore believe that Peary will succeed. I am sure that he deserves success.

I now come to the saddest part of my Arctic story. Next to northern Greenland, the most interesting part of the unknown region is the land on the western side of the north part of Baffin's Bay, between Smith Sound and Jones Sound, and extending along the north side of Jones Sound to the west and north. It was named Ellesmere Land by Sir

Edward Inglefield, who saw it from the deck of the *Isabella* in 1852. It is called *Uming-mak* (the land of the musk oxen) by the Eskimos. No one, so far as we know, has ever landed between Jones Sound and Smith Sound. But in August, 1851, the *Intrepid* and *Pioneer* went up Jones Sound for forty miles, and Sherard Osborn gave a very interesting account of the cruise. Two of his officers landed on a small island at their furthest point, and found Eskimo remains, abundance of vegetation, and some reindeer antlers. In the following year Sir E. Inglefield entered the sound in bad weather, but did not effect a landing. This is all we know of Ellesmere Land south of Smith Sound.

The absence of knowledge respecting Ellesmere Land, and the comparative ease with which its eastern coast may be reached, induced an accomplished and adventurous young Swede, named Alfred Björling, to turn his attention to its exploration. His original plan was to proceed up Baffin's Bay in a St. John's whaler, and to land as near as possible to Cape Sabine, within Smith Sound. During the next ten weeks he proposed to travel by boat and sledge through Hayes Sound towards the Victoria Archipelago, or North Kent. Björling is a botanist, and he believed that this region, while quite unknown geographically, would offer an exceptionally rich field for botanical researches, because its position makes it a connecting link between Greenland and Arctic America. His return journey was to have been directed either to Cape Warrender, or along the east coast of Ellesmere Land, to a spot where he could be picked up by a returning whaler.

This was a well-conceived plan, provided that proper arrangements were made with a whaler. There is no reason why geographers and naturalists should not spend ten weeks of the summer on such useful work, if properly equipped, and if a vessel will engage to call for them before returning home, at a prearranged spot. Björling received a grant from the Vega Exploring Fund and the proceeds of subscriptions, and left Stockholm in the spring of 1892.

Alfred Björling was born in 1871, and always cherished an ardent desire to make discoveries in the Arctic Regions. In order to prepare himself for this work, he wandered through extensive tracts of the mountainous region of Northern Scandinavia during 1887 and 1888, and he was the first to ascend the peak of Kebnekaisse, the highest mountain in Sweden. In the summer of 1890 he accompanied a Swedish expedition to the west coast of Spitzbergen, made valuable collections of Arctic plants, and assisted in the hydrographical and topographical work. In the following year Björling went to Greenland in one of the Danish vessels; and from Upernavik he made a voyage with Eskimos in an *umiak* along the coast of Melville Bay inshore, as far northwards as the Devil's Thumb. He returned to Sweden in the autumn.

Björling was only twenty-one years of age when he became the leader of the Ellesmere Land Expedition. His companion, Evald

Gustaf Kallstenius, was born in 1868, and since 1886 he had been a student of zoology at the University of Upsala, but he had not been in the Arctic regions before. The two young explorers did not succeed in making an arrangement with a whaler at St. John's, Newfoundland, and, after much difficulty, Björling bought a small schooner of 37 tons, called the *Ripple*, for 650 dollars. He succeeded in persuading three men to form a crew, with himself and his companion. A Dane named Karl Kann entered as skipper, an Englishman named Gilbert Dunn formed the crew, and the cook was a North Briton, named Herbert Macdonald. Owing to the long delay in getting the *Ripple* ready for sea, Cape Walsingham was not sighted until July 24, and on the 28th she arrived at Godhavn, having behaved very well in the ice of Dan's Strait. Björling purchased at Godhavn a fowling-piece and a rifle with ammunition, some provisions and clothes, and a boat. He was provided, before leaving Stockholm, with scientific instruments. He left Godhavn on August 3.

Some anxiety for the gallant young Swedes began to be felt when Lieutenant Peary started on his second expedition last July, and he was requested to obtain information respecting their proceedings, and if necessary to go to their relief. In November, 1893, the whaler *Aurora* returned from Baffin's Bay with a report of the loss of the *Ripple*. On June 17, 1893, the *Aurora* was in the north water of Baffin's Bay, and sighted a wreck on the most south-eastern of the Cary Islands. A boat was sent on shore, and the schooner *Ripple* was found driven on the beach, and almost buried in ice. Not far from the wreck there was a heap of stones covering the dead body of a man, probably the Dane Karl Kann. Close by there was a large cairn, in which a tin pot was found, containing open letters from Björling. It appears that he reached the Cary Islands on August 16, 1892, so that the voyage from Godhavn occupied a fortnight, and he crossed Melville Bay in a single day. On the following day the *Ripple* was driven on shore while they were engaged in taking provisions on board from the depôt of Sir George Nares, apparently with the intention of wintering on the coast of Ellesmere Land. Up to this time all appears to have gone well, but the unforeseen calamity of the loss of their vessel must have destroyed all their anticipations of success. They were obliged to remain several weeks at the Cary Islands owing to bad weather; but eventually Björling resolved to undertake the voyage to Cape Clarence or Cape Faraday on the western side of Baffin's Bay, in an open boat, buoyed with the hope of meeting Eskimos. In his letter he said that he hoped a whaler would visit the Cary Islands in the following summer, and that he would consequently try to return with his people by July 1, 1893. He added, addressing the captain of the supposed whaler, "I shall be very much obliged to you if you would go to Clarence Head (50 miles off), where I shall leave in a cairn information relative to our fate during the winter. Our provisions, if I cannot find Eskimos, will not last beyond January 1. We are now five men, of whom one is dying." The date is October 12, 1892. The *Aurora* found that Clarence Head could not be approached in June within twenty miles, and she made no further attempt to comply with Björling's request later in the season.

The conduct of the two heroic lads was admirable throughout. There was the usual risk and danger of Arctic work in their project, but no more, before they lost their vessel. Their message is most touching. Not a sign of fear, not a word of complaint, but the simple words of brave men, most pathetic in their simplicity. There is one circumstance which is worthy of notice. The eastern side of Baffin's Bay is within twenty miles of the Cary Islands, and friendly Eskimos are well known to have settlements there. Yet Björling and Kallstenius chose to go in an open boat to the northern side, which is fifty miles off, and where the presence of Eskimos was uncertain. There can only be one reason. The western side was Ellesmere Land, the appointed place of their work, and even in their dire extremity they resolved to go whither duty pointed. It was not foolhardiness, nor thoughtless enthusiasm, but a sense of duty, which pointed the way. One of the most experienced of our Arctic officers thus wrote on the subject: "It is evident that Björling must have had good sterling qualities, to induce two Englishmen to throw in their lot with him. As they could have left him at the Danish settlements, it would appear as if he was a born leader, and might have become a great man if he had had patience to wait until he had gained experience. However, very little would be done in the world without the enthusiasm of youth. The experience of age cannot be combined with it, so that the latter will never have all the say. Yet a good many victims is the result, and in this case that result is much to be deplored."

When the news brought back by the *Aurora* reached Sweden, there was an idea of a relief expedition. But in the end of 1893, a circular from Mr. Robert Stein, who is connected with the United States Geological Survey Office at Washington, announced his scheme for exploring the whole polar area, and for reaching the pole by a system of gradual approaches. He proposed to establish a station, to serve as a permanent base of operations, at Cape Tennyson, on the northern shore of Jones Sound. Here he intended to place fifteen men always provisioned for two years. Thence he would push forward secondary stations into the unknown area, each with five men. Mr. Stein intended to form the first station in Jones Sound, and he also undertook to conduct a search for the relief of the missing Swedish explorers. Baron Nordenskiöld promised a subscription of $2000 in consequence, and the importance of the Stein expedition was very much enhanced. Funds were, however, much needed. I, therefore, made an appeal for subscriptions in the *Times*, on April 7. But immediately afterwards I was amazed to hear that Mr. Stein had postponed his expedition for another year.

I nevertheless opened a "Björling Relief Fund," and subscriptions were received at the Society's rooms with the object of assisting Baron Nordenskiöld in any measures he might adopt for the relief of his gallant young countrymen. At our meeting on April 9 I made an urgent appeal to the Fellows for subscriptions. Several came forward, including many Arctic officers, who are never deaf to such appeals, and I am happy to say that I have been enabled to forward the sum of £84 10*s.* to Baron Nordenskiöld at Stockholm. But the abandonment of his design by Mr. Stein has left but little time for other measures to be matured. Mr. Nilson has been sent out in the whaler *Eclipse* from Dundee in the hope of reaching Clarence Head; and Dr. Ohlin, with the same object, has proceeded to St. John's, Newfoundland, whence he is to go to Baffin's Bay in June, on board the *Falcon*, the steamer that is to bring back Peary's party.

These arrangements may suffice if the only object is to ascertain the fate of the lost explorers, but if their relief and rescue are intended, it is necessary to despatch a special steamer for the purpose. A vessel engaged in other work, such as whale-fishing or attendance on the Peary expedition, might be induced to touch at Clarence Head, but she might not be able to reach the shore during the time she could allow for that object, and she could not wait beyond a certain time. But a vessel sent for the relief service alone would wait for opportunities, and make a thorough and efficient search. It, therefore, becomes necessary to consider whether the sad duty of ascertaining the fate of those gallant youths, and their companions, alone remains; or whether there is any hope of their having survived.

If Björling fell in with a party of friendly Eskimos, there is no reason why he and his companions should not have survived through two winters, if animal life was abundant round their encampment. This, therefore, is the question: whether there is a reasonable probability of Eskimos being met with near Clarence Head. Many years ago, when I was serving in the Arctic Regions, it was assumed that the western side of Baffin's Bay, north of Lancaster Sound, was uninhabited. In 1851 Sherard Osborn found vestiges of Eskimos in Jones Sound, and when I landed near Cape Warrender, with Sir Erasmus Ommanney, in the previous year, I came upon several stone graves. It was supposed that these remains were very ancient, possibly representing the original migration of the people now settled in northern Greenland. But in 1853 Sir Edward Inglefield found a party of Eskimos in the very harbour where I had landed in 1850, proving that, though wanderers had left their vestiges in the remote past, people of the same race still frequented the region in question.

Their remains were also found by the expedition of Sir George Nares on the western side of Smith Sound. Captain Buddington, who commanded the *Polaris* expedition after Hall's death, met with Eskimos at Port Foulke who had certainly wandered round the whole north-western side of Baffin's Bay from Lancaster Sound. The information collected by Dr. Franz Boas from the Eskimos in Baffin Land is more detailed. They occasionally cross Lancaster Sound from Admiralty Inlet to the neighbourhood of Cape Warrender, but not often, because they have no boats or canoes, and the Sound is seldom frozen over. On reaching the coast of North Devon, they go across the land with their sledges, and in four days reach the coast of Jones Sound, at a place where a long narrow promontory juts out towards Ellesmere Land called *Nedlung*. The promontory becomes an island at high tide, and there is a channel of open water throughout the winter. In the spring this becomes a large open space clear of ice, frequented by enormous quantities of seals. Further north, on the coast of Ellesmere Land, which abounds in reindeer and musk oxen, there was another small colony of Eskimos. These facts are certainly encouraging. Björling would not have landed at Clarence Head until the middle of October, which is against his chances; but, on the other hand, he would not then be more than ten or twelve miles from the Eskimos, if they were still in Ellesmere Land.

On the whole there is ground for hope; and it is discreditable to abandon the unfortunate explorers to their fate. The two Swedish lads are the stuff of which heroes are made, and every civilized people must be interested in their rescue. British subjects are with them, whom we are bound to befriend. Most certainly a special steamer ought to be despatched for their relief. But the time is very short. Hundreds would gladly subscribe their mites, and the funds could have been raised if there had been a year or so to collect it in. But there is barely a month. The only hope was that a few very rich people might be induced to come forward and save the credit of their country. I felt very strongly that a vessel ought to be despatched, and I therefore made every effort, and left no stone unturned to obtain the necessary funds. But I am sorry to say that I was not successful. Our sole hope is now in the efforts of Mr. Nilson on board the whaler *Eclipse*, and of those in the *Falcon*. The *Falcon* will sail from St. John's early in July, under the command of Mr. Henry G. Bryant, the Recording Secretary of the Geographical Club of Philadelphia. It is hoped that Peary's head-quarters at Bowdoin Bay will be reached by July 25, but as Peary and his inland party will not then have returned, the *Falcon* will have about a month to spare for an independent cruise, before embarking the Peary expedition in the first days of September. In a letter I have just received from Mr. Bryant he assures me that he takes a deep interest in the fate of the young Swedes, and his plan includes a landing at Clarence Head and other points, and a search for records left by Björling and Kallstenius. Mr. Bryant also contemplates the exploration of the channel leading west from Jones Sound. I have only just received these particulars from Mr. Bryant, which place the chances of relief for the missing explorers in a brighter light. I heartily wish all possible success to the Peary Auxiliary Expedition and its gallant leader. Dr. F. A. Cooke, who was with Peary in 1891–92, proposes to go up Baffin's Bay with a party of excursionists on board the steamer *Newfoundland*, owned and commanded by Captain J. A. Farquhar, leaving New York on June 25, and intending to return on September 10. Perhaps Captain Farquhar may be induced to visit Clarence Head.

I must take this opportunity of expressing my thanks to Mr. Trevor-Battye for his enthusiastic efforts to promote the despatch of a relief vessel; as well as to Captain Haserick and to Mr. William Pine Coffin, who both felt deeply the shame of leaving the gallant explorers to their fate, and were ready to help, and did help, with the utmost zeal and ardour in so good a cause. Mr. Trevor-Battye, failing the relief expedition, is about to start in the steamer *Saxon* of 150 tons, in company with Mr. Mervyn Powys, to make a thorough ornithological as well as geographical examination of the little-known Kolguev Island, I believe under Lord Lilford's auspices. Mr. Trevor-Battye has studied under Mr. Coles, and the Council has granted him the loan of instruments necessary for navigation. To my mind Mr. Trevor-Battye is cut out for a successful explorer. A hunter of elk on ski in Sweden, of moose and wapiti in the Rockies, a salmon fisherman in the far West, of powerful physique and great powers of endurance, he is also a naturalist, an artist, and an accomplished author. It is to the training and encouragement of such men that the Society must look, if we are to have great travellers in the future, to advance our science, and to do honour to our country.

Circumstances have obliged us to pay very special attention to Arctic questions in the past year; but the great meeting which assembled to hear Dr. Murray's paper on the 27th of last November, is our witness that the Antarctic Regions have not been forgotten. All the scientific societies in the United Kingdom and on the continent are now of one mind as to the importance of Antarctic exploration, and they are convinced that it must be a Government undertaking. It is half a century since Sir James Ross returned, and the time has come for renewing the work which he commenced so admirably. The arguments of Dr. Murray must have brought conviction to the minds of all who had not previously studied the subject. An expedition is necessary for magnetic observations alone. Professor Neumayer wrote to Dr. Murray that "it is certain that without an examination and a survey of the magnetic properties of the Antarctic Regions, it is utterly hopeless to strive, with prospects of success, at the advancement of the theory of the earth's magnetism." Dr. Murray thus summed up the work of a modern Antarctic expedition: "To determine the nature and extent of the Antarctic continent, to penetrate into the interior, to ascertain the depth and nature of the ice cap, to observe the character of the underlying rocks and their fossils, to take magnetic and meteorological observations both at sea and on land, to observe the temperature of the ocean at all depths and seasons of the year, to take pendulum observations on land, to bore through the deposits on the floor of the ocean at certain points to ascertain the condition of the deeper layers, and to sound, trawl, dredge, and study the character and distribution of marine organisms." All these observations are earnestly demanded by the science of our day for many purposes. Science demands a steady, continuous, laborious, and systematic exploration of the whole southern region with all the appliances of the modern investigator.

Enlightened by the exhaustive and most interesting paper of Dr. Murray, and encouraged alike by his enthusiasm and by the sound sense of his remarks in favour of the renewal of Antarctic exploration, our Council appointed a committee with instructions to report upon the best means of achieving the objects set forth by Dr. Murray. Our Antarctic Committee consisted of Sir Joseph Hooker, one of the two survivors of Sir James Ross's expedition; of Sir George Nares, the only living naval captain who has navigated the Antarctic Ocean; of Captain Wharton, the hydrographer; of Admiral Sir Erasmus Ommanney, who has long been a warm advocate of such an enterprise; of Admiral Sir R. Vesey Hamilton, one of our best Arctic authorities, who has also written on the subject of Antarctic navigation of Dr. Murray and myself.

The Committee, in its report, enumerated the scientific results of Antarctic research, especially dwelling on the necessity for an accurate study of terrestrial magnetism. The experiences of early navigators in approaching the pack edge are then reviewed, and it is shown that Sir James Ross alone boldly entered it, with a view to passing through it, on two occasions with success. In January, 1841, he forced his way through it in four days, reaching an open sea, discovering Victoria Land, and penetrating to the 78th parallel. On the second occasion he entered a pack several hundreds of miles in width, and he was forty-two days getting through, but he again succeeded. In 1843, on his third attempt, it was too late in the season when he entered the pack, and the young ice was forming rapidly. If it had been December instead of March, he might have effected more. The committee then contrasts the conditions of navigation in the Arctic and Antarctic Regions. In the north there are fields of ice of vast extent, often fixed for months in one place by intricate channels. The danger of long detention, arising from being beset in such ice, is not so serious in the Antarctic Regions. But there are other dangers which are equally formidable. In gales of wind and in fogs, and even in calms, sailing vessels are in much danger, when involved in the pack, from the swell caused by heavy gales, and when it is impossible to avoid collisions with huge masses of ice. On such occasions a sailing vessel is helpless.

But as screw steamers would, of course, be employed on any new Antarctic expedition, these dangers would be very much reduced, and a great saving of time would be effected. Calms occur, and there are often adverse winds when there is clear weather. At such times sailing vessels would be beating up 20 miles while a steamer might make 100. With steam it might be possible to do in one season all that which, in the cases of Wilkes and Ross, occupied three. A steamer would be in little danger from bergs except in fogs, and in heavy gales she could lie to in safety under their lee, instead of drifting at the mercy of wind and waves. She would also be better able than a sailing vessel to double the pack. The weak point of a steamer in the pack would be during a gale of wind. She might avoid collision with the ice better than a sailing vessel, but not altogether. But specially adapted screw steamers would no doubt facilitate Antarctic navigation, and remove many of the difficulties which had to be encountered by sailing vessels.

Having fully considered the exigencies of Antarctic navigation, the Committee recommend that the expedition should consist of two vessels as well strengthened against the ice as were the *Erebus* and *Terror*, fitted with steam-power, and specially protected aft. It is indispensable that officers and crews should be under naval discipline, and a full commission of three years would be necessary for the performance of the work. Apart from the valuable scientific results of an Antarctic expedition, the Committee dwell upon the excellent effect that all such undertakings, in which our country has been prominent, have invariably had on the navy, by maintaining the spirit of enterprise.

Having been adopted by our Council, the report of our Antarctic Committee, together with Dr. Murray's paper, was transmitted to the Royal Society, with an urgent request that that learned body would take the subject of the renewal of Antarctic discovery into serious consideration, with a view to its being brought before her Majesty's Government in a memorial presented by the Royal Society, with the cordial assent of every scientific body in the United Kingdom. I understand that a committee has been appointed by the Council of the Royal Society, and that the important question is receiving mature and careful consideration. The Fellows may rest assured that no efforts on the part of our Council will be wanting, and that the duty of promoting the renewal of Antarctic exploration will be borne in mind. If men of science are unanimous, both as to the importance of the work and the best method of executing it, and if they are backed by enlightened public opinion, the Admiralty will be only too glad to take the subject into favourable consideration, and difficulties raised by the Treasury will be overcome. But unanimity and the support of public opinion are absolutely essential to success.

I have devoted the body of my address to work within the polar regions. I will not, however, omit to refer to the labours of others in regions which, through their exertions, may become the main subjects of future addresses. You have recently heard an account of the results of the journey of Mr. and Mrs. Littledale, which are in many respects remarkable. It was a very hazardous adventure; it covered several hundreds of miles of entirely new ground, and very careful observations were taken all along the route, which have been embodied in a valuable map. The additions made by Mr. Littledale to our knowledge of the famous route to China, followed by Marco Polo, are of the first importance.

Of no less interest is the journey into the Hadramaut valley accomplished by Mr. and Mrs. Bent, an account of which was presented to us a week ago. They were accompanied by an excellent surveyor deputed by the Government of India, and by a botanist from Kew, while their own archæological notes, photographs, and sketches are of exceptional value. These experienced travellers were so interested in the strange and almost unknown country of Hadramaut that they hope to return to continue their explorations in Arabia.

In Africa there has been, and continues to be, abundant activity, as the monthly pages of our Journal have shown. We have already heard a very full account of Dr. Gregory's expedition to Mount Kenia; and we hope shortly to have full details of the expedition into new country north of the Tana river, led by Mr. Astor Chanler, accompanied by Lieutenant von Höhmel. Mr. Scott Elliot is actually exploring the Ruwenzori region, and we have helped to equip other young African travellers who hope to open up new ground. Mr. Coryndon, a friend of Mr. Selous, has already started for the country lying between the west shore of Lake Tanganyika and the Congo, where he will remain for at least a year. Dr. Donaldson Smith, a young American gentleman, leaves in a few days for Somali-land, whence he will push southward to Lake Rudolf, thus connecting the discoveries of Count Teleki with those that have been made further north.

How valuable a service is being performed by our indefatigable map curator, Mr. Coles, in giving instruction to intending explorers, is shown by the work that has been done by his pupils within the last two years. In Africa, Major Leverson and Mr. F. A. Lamb have done surveying work on the Anglo-German Boundary Commission, Dr. J. W. Gregory has surveyed and mapped the Mount Kenia region, Mr. Teed is now surveying in the territory of the Royal Niger Company, Captain Gallwey has been at work in the Oil Rivers Protectorate. Lieutenant S. Vandeleur of the Scots Guards has made an exceedingly well-executed route-survey in Somali-land, checked by observations for latitude. Mr. G. F. Scott Elliot is at work in the Ruwenzori region. In Asia, Mr. Conway has made surveys and a map of the Karakoram glaciers, and Mr. Littledale has done valuable work in Central Asia and on the Hoang Ho. In America, Mr. C. W. Anderson has been working in British Guiana; and our travelling students, Mr. G. B. Grundy and Mr. Cozens Hardy, have surveyed, one the battle-field of Platæa, the other a part of Montenegro.

I must not omit to refer to the admirable work accomplished by our librarian, Dr. Mill, in the survey of the English lakes, in which he has opened up a hitherto unknown part of our country, although a part which is under water. At one of our meetings in June, Dr. Mill will explain to us some of the more interesting results of his limnological investigations.

On several occasions during the session I have regretted the absence of my illustrious predecessor Sir Henry Rawlinson, on whom the mantle of Sir Roderick fell in 1871. I especially missed him on the occasion of Colonel Sawyer's paper on the Bakhtiari country being read; and, indeed, I had a faint hope that he might once more appear amongst us on that occasion, to brighten the discussion by his profound knowledge and unrivalled powers of exposition. Sir Henry was one of the best of our Presidents from every point of view, and I do not know his equal in giving life to an apparently dull subject, and in awakening an interest in geographical details by enriching them from the abundant stores of his historical memory. I shall never forget the rapt attention with which the audience listened to his account of the route taken by the gipsies on their way towards Europe, from the valley of the Indus. He is unrivalled in showing the dependence of history on a knowledge of geography; and though he is often missed by those who remember the time when he presided here, he can never be replaced. I still indulge the hope of seeing him amongst us before the session is over.

In conclusion, it is my duty to announce the retirement of Mr. Douglas Freshfield from the post of Secretary, and that he has declined to allow himself to be put in nomination as a member of the new Council. Mr. Freshfield was my colleague from 1881 to 1888, and for the last six years he has been senior Secretary of the Society. A renowned climber and Alpine explorer, he now holds the honourable post of President of the Alpine Club. But he is not a mere climber. He is well versed in the historical literature of the Alps, as is shown by his papers on the Alpine notes of Leonardo da Vinci in 1884, and on the pass of Hannibal in 1886. He was also the author of sketches in the mountains of Ticino. Having exhausted the Alps, Mr. Freshfield turned to the Caucasus, and our *Proceedings* have been enriched by four of his papers, describing with a master-hand the physical aspects of that little known range, and his own well-planned and successful ascents. He also published a work on Central Caucasus and Bashan. Mr. Freshfield gave up much of his time to the Society, and was indefatigable in his supervision of the work of the departments, and initiated our large and valuable collection of photographs. He introduced the use of photographic slides at our evening meetings. He took a special interest in educational questions, and the Society's arrangements with the Universities of Oxford and Cambridge owed much to his active and zealous aid. He read a paper of great importance at the British Association Meeting of 1886, on "The Place of Geography in Education." In that paper he truly remarked that much of the literature of physical science was rendered unreadable by the absence of the art of letters in its producers. The classics, he added, are the authors and models of the art of clear and condensed expression for European literature. And this reminds me that one of Mr. Freshfield's highest qualifications for the post of our Secretary was that he was a classical scholar. How often have I deplored the loss of this qualification through having gone to sea so young! Mr. Freshfield conducted a good deal of correspondence, both private and official, the results of which were very conducive to the best interests of the Society. As an example, I may mention his letters to the India Office, to which were due the establishment of an excellent understanding with the departments in India, and to our being regularly supplied with geographical information which was previously withheld. He was joint editor of the three latest editions of 'Hints to Travellers,' taking the subject of outfit as his own part of the work. For these varied and important services the warm thanks of our Council and of the Society are justly due to Mr. Freshfield. Although he retires, by his own desire, from any further official connection with the Society, he will, I am sure, continue to take a warm interest in our proceedings, and to be an active and zealous, though independent member of our body.

We have had heavy losses this year from the deaths of distinguished Fellows, whose obituaries have appeared in the numbers of our Journal. Among them were several dear friends of my own, and I cannot help mentioning how deeply we have all felt the loss of our late Foreign Secretary, General Sir Beauchamp Walker.

I have to thank Captain Wharton, the hydrographer, for the account which follows of the work that has been done during the year by our naval marine surveyor, to whose hard work navigation and geography owe so much; and Mr. C. E. D. Black for his abstract of the work of the Indian surveys during the past year.

The magnificent work prepared by a Commission, under the auspices of the Italian Government, as Italy's contribution towards the celebration of the fourth centenary of Columbus, has just reached me. In the name of the Fellows of this Society, I have warmly congratulated our brother geographers in Italy on its appearance. A review of the great Colombian work follows this Address.

Obituary of the Year.

General Saunders Abbott; J. D. Allcroft; Sir James Anderson; Richard Edward Arden; F. B. Ashton; Sir Samuel White Baker, Pasha; General Sir T. D. Baker, K.C.B.; General Sir George Balfour, R.A., K.C.B.; W. H. Balls; W. L. Barclay; H. M. Becher; Richard Bird; George Bonnor; J. C. Bowring; G. P. Boyer; Alex. Low Bruce; Colonel J. J. N. Buchanan; Lord Calthorpe; Commander Verney Lovett Cameron, R.N., C.B.; Colonel Edward Cave; Victor William Chemery; Colonel F. C. H. Clarke, R.A., C.M.G.; Henry Cookson; Rev. Henry Woodward Crofton; the Earl of Cromartie; Rev. Thomas Debary, M.A.; Fitzwilliam H. Dick; E. A. Drummond; Charles Bernard Durkin; Lord Ebury; Edward Bickerton Evans; Henry Prinsep Fane; Lieut.-Colonel W. Spiller Ferris; Captain the Hon. George Fitzclarence, R.N.; John Fleming; Professor P. W. Forchhammer; Frederick Francis; Alexander D. Frater; George H. Garrett; General the Hon. Sir Alexander H. Gordon, K.C.B.; J. Graham; Joseph E. Green; Rev. J. B. Gribble; Captain R. C. Halpin; James L. Hart; Thomas Hawksley, F.R.S.; Horace Augustus Helyar; John Heugh; W. F. Hooper; Edward M. Hopkins; Augustus Huxtable; Rear-Admiral Marin H. Jansen, D.R.N.; Edward King; John King; Lieut.-General W. C. R. Macdonald, C.B.; Sir William Mackinnon, Bart.; General E. Mackirdy; General Sir W. M. S. MacMurdo, K.C.B.; Lieut.-General Sir Richard Meade, K.C.B.; G. F. Mewburn; Thomas Holdsworth Newman; Robert Nicholson; F. H. S. Orpen; W. Cotton Oswell; Admiral John E. Parish; Mansfield Parkyns; Vice-Admiral H. B. Phillimore, C.B.; Sir Gerald Herbert Portal, K.C.M.G., C.B.; Hon. Leopold Powys; F. S. Pulling; John Rae, M.D., F.R.S.; John Bagot Scriven; Rev. William J. Smith; Richard Spruce; George Stanton; Alfred Strong; Captain A. Styan; Edward Thornton, C.B.; Colonel D. H. Trail, R.E.; Admiral Sir George Tryon, K.C.B.; Samuel Richard Van Campen; Sir Harry C. Verney, Bart.; Right Hon. Lord Vivian, K.C.M.G.; General Sir C. P. Beauchamp Walker, K.C.B.; Henry Fraser Walter; G. Andres Wilson; Major-General Edie Lloyd Wynne; H. G. Yates.

Admiralty Surveys.

Under the orders of the Lords Commissioners of the Admiralty there have been employed in hydrographical surveys in various parts of the globe, 7 steam-vessels of war and 2 small hired steam-vessels, with crews consisting of 66 officers and 629 men.

The various localities where these surveying vessels have been employed are as follows: The shores of Great Britain, Newfoundland, Malta, Hong Kong, Straits of Malacca, Solomon Islands, Australia east coast, New Hebrides, and Tasmania. As usual, a report of the work executed by each vessel has been prepared, and will be presented to Parliament. What has been accomplished may be summarized as follows:—

On the east coast of England a re-survey of Filey Bay, Yorkshire, has been made, and the approach to King's Lynn was resounded. In continuation of the work of the preceding season, an area of about 300 square miles in the North Sea, situated to the northward and eastward of the Humber river, was thoroughly sounded out on a scale of two inches to the mile. A survey was completed of the river Deben, in Suffolk, from its entrance up to Ramsholt dock; and various localities in the entrance to the Thames, where changes are constantly taking place, were examined.

On the south coast a careful survey was made of Spithead and its eastern approaches, many years having elapsed since the last survey was made, but it was found that the changes which have taken place have not been great. In consequence of reports that the depth in the main anchorage in Plymouth Sound was less than shown on the chart, a thorough re-survey was made of the Sound, Cattewater, and part of the Hamoaze, and the unpleasant fact was revealed that the larger ships would in certain places in the Sound touch the bottom, with the water at the level to which it occasionally falls. Dredging has consequently been at once undertaken.

On the west coast of England an examination was made of the dockyard bank in Pembroke Reach, which resulted in the discovery of several rocky heads and patches. A re-survey of the English and Welsh grounds in the Bristol Channel was completed, and considerable alterations were found to have taken place in this locality. A large scale plan was also made of the harbour and bay of Ilfracombe. In continuation of the work of the previous year, the survey of Carnarvon Bay was taken in hand and completed as far as the South Stack; during the progress of this work, several rocks, hitherto uncharted, were discovered. A survey of the north coast of Anglesea was also taken in hand and completed between the Middle Mouse and Lynus Point.

On the east coast of Ireland a re-survey of Wexford harbour and bar was commenced, when it was found that considerable alterations had taken place since the previous survey in 1881.

The work on foreign and colonial shores has been as follows: On the west coast of Newfoundland a survey of St. George's Bay was nearly completed; this work will be especially useful, as at present there is no chart of the locality in which the navigator can place any confidence. During the progress of the survey, no fewer than nine rocks, with a less depth of water than five fathoms over them, were found to exist round the shores of this bay.

In the Mediterranean a re-survey of the Maltese islands has been commenced, and the result of the season's work will be a new chart, on a scale of 4 inches to the nautical mile, of the Comino channels and the coast of Malta from Madalena Point to Ras el Raheb; the main part of the triangulation of the remainder of the island was also completed. The examination of the new channel into Alexandria harbour, called the "Straight Boghaz Pass," was carefully carried out. Extensive dredging operations have lately taken place there, but several spots were detected where the rock had not been levelled to the required depth.

On the coast of China, the eastern approaches to Hong Kong were surveyed between Cape Collinson and Cape D'Aguilar, thus completing the whole of the Tathong Channel. The survey of the western part of Hong Kong harbour was completed, and on the south side of the island a survey of Tytam Bay, with the neighbouring island and channels, was executed, so as to join up with the other work at Cape D'Aguilar.

In continuation of the work done on the Macclesfield bank in the preceding year, a systematic survey of the eastern half of this extensive coral atoll was carried out, and now the whole of the rim has been carefully examined. No actual dangers to navigation were discovered during this survey, but the eastern portion of the lagoon abounds in coral patches, with from 7 to 8 fathoms of water over them. On the outer rim 6 fathoms was the least water found. The dredge was in daily use, and a valuable collection of corals obtained from all parts of the bank, in depths varying from 8 to 74 fathoms. The specimens were examined by Dr. Bassett-Smith, and afterwards forwarded to the British Museum.

In the southern part of the China Sea, the survey of the Anamba Islands was continued, and now the whole of this hitherto little known group has been completely charted.

Telegraphic meridian distances were obtained between Singapore, Malacca, and

Penang, and the astronomical positions of several salient points in the Straits of Malacca carefully determined. A large scale plan of the mouth of the Klang river, in the Malay Peninsula, was also completed.

In the Solomon Islands, of which our hydrographical knowledge is exceedingly meagre, a survey has been commenced of New Georgia and adjacent islands. By the end of the season an examination had been completed from the western end of Gizo Island, including Ferguson Passage, Rendova and Montgomery Islands, to Cape Pitt, and from thence along the northern shore to the westward as far as the Marovo opening into the lagoon. The astronomical positions of several places were also carefully determined. A considerable amount of rainy weather was experienced during the progress of the survey, from the end of July to the end of December, but the season's work has resulted in the charting of a large area hitherto almost unknown. In spite of the evil reputation enjoyed by the natives of New Georgia, no difficulty was experienced with them; and, after their first timidity had been overcome, they were most friendly and obliging.

In Australia, the survey of the inner route along the coast of Queensland was continued from the Bird Islands, 13 miles north-west of Cape Grenville, and completed as far to the southward as the Piper Islands. During the progress of this survey, a rock, with only 17 feet of water over it, was discovered, a mile and a half north of the track recommended, between Home Islands and Cockburn reef. Fortunately this rock has not been found by a vessel striking on it.

In the western approach to Torres Straits, a fortnight was devoted to the examination of an area in the vicinity of the Proudfoot shoals, where two small dangerous rocks had been reported in the fairway, and out of sight of land. A careful search failed to discover any new danger, though a depth of 2¾ fathoms was found on the West Bramble patch, hitherto supposed to have no less than 4 fathoms over it.

In consequence of the more frequent visits of H.M. ships to Tasmanian waters a plan of Port Arthur in the Tasman Peninsula was completed on a scale of 3 inches to the mile.

The survey of the New Hebrides has been continued, and the whole of the south coast of Ambrym, west and north-east coasts of Epi, with the channel between the two islands, including Paama and Lopevi, have been charted on a scale of one inch to the nautical mile, as well as the south coast of Malekula. Larger scale plans of Dip Point anchorage and Craig cove on Ambrym Island; Ringdove Bay, Foreland anchorage, and Nelson Bay on Epi Island; Maskelyne Islands, Tomman Island, and Port Ravallec on Malekula Island, have also been executed.

Naval surveying officers have also been employed, with the sanction of the Admiralty under the orders of the Indian Government, and during the season continued the survey of the Coromandel coast from False Divi Point as far to the southward as Shallingar shoal in lat. 14° 20′ N. During the progress of this survey, several new shoals which are dangerous to navigation were discovered; they have doubtless been formed since the last survey was made in 1848, and are probably due to the northerly set of the currents during the greater part of the year redepositing the silt brought down by the rivers, augmented by the sand and mud stirred up by the sea during the strong monsoons and hurricanes. A large scale plan of the port of Bombay was completed, and the survey of the coast to the northward of that harbour commenced. By the end of the year it had been completed as far as lat. 19° 20′ N. The Laccadive Islands were visited, and plans made of Ancutta, Kavaratti, and Suheili Islands, besides lines of deep soundings obtained between various islands of the group.

The importance of accurate surveys on a large scale is strikingly illustrated by the number of rocks and dangers to navigation annually discovered, this number being steadily on the increase; no less than 201, which it has been deemed necessary to notify by Notices to Mariners, having been reported during the year 1893.

During the year the hydrographic department has published 69 new charts and plans, and 16 plates have been improved by the addition of 16 new plans, while 4836 corrections have been made to the chart plates.

GEOGRAPHY AT THE UNIVERSITIES.

The following reports have been sent for submission to the Council by the Reader in Geography at Oxford, and the Lecturer in Geography at Cambridge and Manchester.

OXFORD, *May* 25, 1894.

My lectures during the past academic year have been well attended. The number of undergraduates reading history varies somewhat from time to time, and the classes during Michaelmas and Hilary Terms were rather smaller than in the previous year, when they were larger than on any earlier occasion. That the utility of the work has not diminished in the opinion of the tutors who send students to the lectures, is indicated by the fact that the number of colleges supplying students is the same this year as last.

The chief gain of the past year has, however, been in the subject of Physical Geography and in the summer term. For the first time since the foundation of the Readership, there has been a fair attendance in this subject and in this term, though naturally the numbers are not equal to those taking Historical Geography in the winter terms. At last, therefore, after seven years of gradual progress, the whole of the instruction offered by the Reader has been received by adequate classes.

The precise statistics are as follows:—

Michaelmas Term. Subject—Historical Geography. Lectures twice a week. 35 men from 12 colleges; 12 ladies from 4 halls.

Hilary Term. Subject—Historical Geography. Lectures twice a week. 37 men from 14 colleges; 6 ladies from 2 halls.

Summer Term. Subject—Physical Geography. Lectures twice a week. 6 men from one college; 4 ladies from 2 halls.

The electors have chosen Mr. C. R. Beazley, M.A., Fellow of Merton College, for the Geographical Studentship of the current year. Mr. Beazley is proposing to work on the East Coast of Africa, with a view to the better identification of points mentioned in the Periplus of the Erythrean Sea and other similar geographical documents. Mr. G. B. Grundy, the student of 1892, has published the results of his investigations in Greece in a small volume recently issued by the Society. Mr. W. H. Cozens-Hardy, the student of 1893, has worked on the borders of Montenegro and Albania, and is now engaged in the preparation of his results.

A course of ten lectures, under the auspices of the Society, in continuation of those delivered by me in the winter of 1893, was given in London in the months of January, February, and March in the present year. Owing to various circumstances, the attendance was not equal to that of last year. I believe, however, that if the proposals now under your consideration be adopted, you may look for much larger results from the next course. From an educational point of view, there is no reason to be dissatisfied even with the last course, for the audience included at least thirty *boná-fide* teachers.

H. J. MACKINDER, M.A.

KING'S COLLEGE, CAMBRIDGE, *May* 18, 1894.

Having been appointed successor to Mr. Buchanan, as Lecturer in Geography at Cambridge, I began my duties in October last with an inaugural address on the "Progress of Geographical Discovery," which was attended by a large audience, including the Vice-chancellor of the University.

During Michaelmas and Lent Terms I lectured on the "Principles of Physical Geography" to a satisfactory class averaging fifteen in number. Through the kindness of Professor Liveing I had an excellent lecture-room in the chemical laboratories placed at my disposal. The use of a room in the New Museums has also been temporarily granted, for the storage of apparatus, of which at present there is none. This deficiency, however, I hope to be able to remedy to some extent, owing to the favourable reception of an application for a grant of £20 from the University chest.

Last summer I gave my second series of lectures at the Owens College, Manchester, when a marked advance on the first year was made.

Two courses of lectures were given, one on a special subject, "Asia," designed for the requirements of a special class of students, and the other of more general interest. The numbers of those attending the courses were twenty-nine and ten.

The quality of the work done showed an improvement, and a satisfactory feature, indicating an increased interest in the teaching of geography, was the attendance as students of several persons who are engaged in educational work outside the college.

H. YULE OLDHAM.

THE SURVEY OF INDIA, 1892-93.

By C. E. D. BLACK.

THE work of the Indian Survey Department during the years 1892-93 was carried on by twenty-one parties and three small detachments, who were engaged as usual on trigonometrical, topographical, forest, cadastral, and traverse surveys, latitude and tidal observations, spirit-levelling, geographical surveys and reconnaissances, and the regular mapping and reproduction ancillary to these operations. The triangulation lay along the meridian of 96° 30′ in Burma, north of Mandalay, and was extended for a distance of 70 miles as far as the parallel of 23° 30′ N. latitude. A secondary series on the parallel of 21° was carried eastwards over 104 miles, the measurement beginning a little east of Fort Sandeman and terminating near the Mekong. The most important topography delineated was in Baluchistan and the adjoining parts. A detailed reconnaissance through the Helmand desert, Sistan, and Perso-Baluchistan was entrusted to Mr. E. A. Wainwright, who was assisted by Ahmed Ali, K.B., Atma Ram, and Sheikh Mohiuddin; while Yusaf Sharif, K.B., did a good outturn of surveying along the Persian coast, his first base being measured at Chabar, and his second at Bandar Abbas. His work generally was connected with Mr. Wainwright's reconnaissances. The extension of triangulation into the Zhob valley was executed by Captain Mackenzie, while Messrs. Claudius and Tate took charge of the special surveys near Quetta and the settlement surveys for revenue purposes in the Peshin valley. Mr. H. Kitchen had control of the half-inch topography of the Lower Bela district, a tract which is comparatively open near the coast of the Arabian Sea, but becomes very rough to the northward. As the spring advances, water in this region is scarce and bad, and there is great difficulty in keeping up communications in the hill districts. Mr. Kitchen never recovered from the trying effect of the season's work, and died at Quetta on July 5, 1893. Some 3700 square miles of topography in Makran were completed by Abdul Guffar, K.S., who with Atma Ram was subsequently, in May, 1893, deputed to Gilgit to undertake reconnaissance work there. A more extraordinary change of climate from the burning wastes of Makran to the eternal snows of the Himalayas can hardly be conceived. Two other native surveyors were attached to a political party on tour through the outlying districts of Zhob and Kundar, and brought back 4500 square miles of reconnaissance on the quarter-inch scale. Colonel Holdich visited the Makran and Persian coasts, and made some interesting experiments with a view to estimate the value of the cable for longitude determinations. Unfortunately, though special reports were prepared by him on these operations as well as on the general subject of trans-frontier surveys, none of these reports finds place in the present account of the survey, an omission which is the more inexplicable as the Baluchistan narratives have been hitherto regularly included in the annual reports of the Surveyor-General. During the year Sub-assistant Superintendent Imam Sharif returned from special duty with the Anglo-German boundary-demarcation party in East Africa. He had been warmly commended for his able assistance as a topographer by the British Commissioner, and received a decoration from the Sultan of Zanzibar. His health has, however, suffered considerably from hard work and exposure amid the dangers of the African climate. Another important survey commenced during the year was that of the River Indus in Sind, from the Punjab frontier to the sea—a measure which has been rendered necessary by the great changes that have taken place in the course of the river since it was last mapped in 1856 to 1870. The new survey will occupy at least three years. The cadastral and other detailed surveys in Bengal, Burma, and elsewhere, do not call for special notice, but mention should be made of the work of two sections of No. 11 party, who accompanied the Commission for demarcating the boundary between Burma and Siam. A good deal of country had already been well reconnoitred by the surveyors with previous boundary missions, but corrections were made by No. 11, and gaps filled up where necessary. Colonel Woodthorpe and Mr. Kelly were in charge of the eastern, and Messrs. Doran and Shaw of the western section. The boundary itself being in every case a conspicuous watershed or the course of a stream, very little artificial marking has been adopted beyond clearing all salient hilltops of forest, and marking one or two trees with the broad arrow and '93. The programme of the party for the current season (1893–94) was to continue the survey of the Shan States, to fill in a small gap in the map of the Karenni country, and to complete the Anglo-Siam boundary. In the northern Trans-Salwen Shan States, Captain Renny-Tailyour mapped in 1892–93 over 5000 square miles of a hitherto but little known region, while to the north east of Lashio a sudden rising of the Kachins was suppressed by the promptitude and pluck of the survey officer, Mr. J. M. Kennedy. The most interesting new ground explored was that covered by Captain Renny-Tailyour's operations. This included the Wa country, whose inhabitants had been reported to be cannibals and to live like wild men in the jungles, but who turned out to be more civilized than expected. They are all spirit-worshippers, and offer up large numbers of buffaloes, pigs, and fowls; their least pleasing idiosyncrasy is an idea that on very special occasions, such as when they sow their fields, or an epidemic of sickness is abroad, it is advisable to offer up a human head. These heads are obtained in the wild Wa country by sending out a head-hunting party, who catch any stray travellers they come across and decapitate them. Near Hsan Htung Captain Renny-Tailyour and his party came on the bodies of three men lying on the road whose heads had been cut off a few hours before. The Was near Lün Long are said by the Shans to be "not so very bad," the principal difference being that they buy their heads instead of raiding for them. The country generally is hilly and populous, the villages are numerous and large and are connected with each other by very good roads, but there is next to no trade. The main road usually runs into the heart of the village, through a tunnelled entrance, which proved a great obstacle to transport. Much ground is given up to the cultivation of the poppy for opium, and large silver-mines undoubtedly exist; but though gold is also said to be plentiful, the surveyors did not see any. No actual fracas took place with the Was, but Captain Renny-Tailyour thinks that the next attempt to traverse their country may meet with considerable opposition.

The photographic, lithographic, drawing, and other head-quarter officers of the Survey did good work as usual. Among the more notable maps may be mentioned the sheets of the new survey of Calcutta, which are being rapidly turned out, and a third edition of the two-sheet map of the city. A new geological map of India, on the scale of 96 miles to the inch; a map on the same scale, showing the railway lines and distribution of coal; and three maps illustrating events in Mr. G. W. Forrest's 'History of the Indian Mutiny,' were also completed, besides a large number of plates of illustrations for archæological and other works published by Government. Colonel Waterhouse records his experiments for reproducing brush-shaded maps, and printing them in colours by heliogravure, one of which has been attended with decided success. In this case, the hills were drawn on ground-glass with a black creta-levis pencil, which drawing served at once as the positive transparency for obtaining the image on the copper plate. A capital specimen of this photo-etching, printed in three colours, is appended to the new volume, and there appears to be no doubt that the greater clearness, finish, and durability of the copper plate will render the process far superior to lithography for high-class map work.

THE ITALIAN MONUMENT TO COLUMBUS.

By CLEMENTS R. MARKHAM, C.B., F.R.S.

ITALY has undoubtedly contributed the worthiest and best memorial in honour of the fourth century of the discovery of the new world by her illustrious son. A collection of all the contemporaneous documents relating to Columbus, with essays by the most learned men to be found in the land, on every disputed point and every question of interest relating to the great discoverer, is a noble monument. Many of the brightest intellects of his native country have devoted five years to the grateful task of elucidating the history of their immortal compatriot and of his discoveries. No less than six have died while the work was in progress. The Government of Italy appointed a Royal Colombian Commission, and spared no expense in the production of these fourteen splendid volumes which form the Italian monument to Columbus, either as regards paper, or type, or illustrations.

The first two volumes of the first part contain all the known writings of Columbus, and photographs of all his autographs, with a preface and elaborate dissertations by Signor Cesare de Lollis, who was formerly Secretary to the Historical Institute of Italy. This part of the work had been destined for Mr. Harrisse, if he had not separated himself from the undertaking. Here we are given the journal of the first voyage, the letters to Santangel and Sanchez, all the reports and letters to the sovereigns, the first entail, the correspondence with Roldan, Gorricio, and Ovando, and the Admiral's letters to his son. Then follow the 'Profecias,' and all the notes in the Admiral's handwriting, in the margins of the 'Imago Mundi' of Pierre D'Ailly and other books in the Colombian Library at Seville. All the scattered information that formerly had to be searched for in various works, and some of which was only accessible in manuscript at Seville, is now collected in these two volumes.

The second part is only second in interest. Here the disputed questions respecting the birth and family of Columbus, and his conduct on various occasions in after-life, are discussed by so competent a critic and historian as the Signor Cornelio Desimoni. He settles the time and place of the birth of the great Genoese—it is to be hoped finally—and discusses the dates of his arrival in Portugal and of the Toscanelli letters. There are, of course, some points which can never be cleared up owing to insufficiency of evidence, and among them is the legitimacy of Fernando. Desimoni believes that the evidence against the great discoverer kicks the beam, and adds, "Colombo infine era un uomo; chi oserà lanciargli la pietra." The Genoese historian also discusses the knowledge and the character of his famous fellow-townsman. The evidence respecting the corsairs named Colombo, whose appearance in history has caused so much confusion, is fully treated by Alberto Salvaginani, who also has occasion to examine critically the meagre facts for forming a judgment on the date of the arrival of Columbus in Portugal, and of the Toscanelli letters.

Signor Achille Neri ably sets forth the history of all known portraits of Columbus, engravings of which are given in the volume. It is now admitted that the picture once in the gallery of Paolo Giovio, and now possessed by his descendant, Dr. Alessandro de Orchi, of Como, is the only one with any pretension to authenticity; and that all those of similar type are merely imitations of it, with various alterations. Such are the pictures at Madrid and Florence, the Cuccaro, Cogoleto, and Rouen portraits, and even that belonging to Roselly de Lorgues, as well

THE

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The Society has already issued all that has been written by Columbus himself concerning his discoveries; and all writings bearing on the voyages of Cabot and Cortereal, as well as the record of Galvano, and Pigafetta's narrative of the voyage of Magellan; also the voyages of Drake and Hawkins, and the discovery of the Canaries by Bethencourt.

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Central Asia and Persia are illustrated by Sir Henry Yule's great work, entitled *Cathay and the Way Thither*, as well as by the Embassy of Clavijo to the Court of Timor, and the narratives of Barbaro and Contarini. Mr. Badger's history of Omân and the travels of Varthema represent Arabia. Schiltberger, and Mr. Bent's volume of narratives of Covel and Dallam, relate to Turkey and the Levant Company. For early accounts of Russia there are the narratives of Herberstein, of Fletcher and Horsey, and of Anthony Jenkinson; while there are two volumes on intercourse with Japan in the seventeenth century, and Mendoza's China.

The Divers Voyages of Hakluyt open the list of volumes relating to the American continent, which includes Strachey's Virginia, Butler's Bermudas, Hakluyt's Florida, Benzoni, two works on the Amazons, Raleigh's Guiana, La Plata of Schmidt and Cabeza de Vaca, the captivity of Hans Stade in Brazil, the 5th letter of Hernan Cortes, and seven Spanish chronicles on the conquest of Peru and the civilisation of the Incas.

For Africa the Embassy of Alvarez to Abyssinia is as yet the only volume issued; but another most important work, the narrative of Leo Africanus, is in course of preparation by Dr. Robert Brown.

All the volumes have Introductions, and are carefully annotated by the best editors that could be found for the particular subject.

A great number of almost equally important voyages and travels remain to be edited; and it is very desirable that the number of members should be materially increased.

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as the engravings in the 'Elogia virorum.' All others are simply the fruits of the painters' not very imaginative invention, from that attributed to Parmigianino at Naples, to the hideous caricature published in De Bry. The small panel belonging to Dr. Alessandro de Orchi is, therefore, priceless.

The third part contains diplomatic correspondence from Venetian and other Italian orators (ambassadors) relating to Columbus, and the letters of Pietro Martire, Vespucci, Vianello, Marino Sanuto, and others. In the fourth part we have an admirable series of essays by the well-known traveller D'Albertis on the ships of the Middle Ages, as an introduction to a description of the ship and caravels of the first voyage, and essays on early cartography, on the observations made by Columbus, and on the instruments used in his time. Signor Bertelli contributes a very learned dissertation on the discovery of the variation of the compass.

The fifth part has not yet reached us, but it will comprise monographs on the Italian precursors and continuators of the work of the great Genoese, such as Toscanelli, Pietro Martire, Vespucci, Caboto, Verrazzano, Pigafetta, and Benzoni. It will comprise three volumes of great interest; and the sixth and last part is an elaborate bibliography of the works relating to Christopher Columbus and the discovery of America.

This is indeed a noble and imperishable monument to a great man. It will endure for centuries after all the carping criticism on the words and acts of Columbus has been forgotten, except for the few notices preserved to point a moral in its pages. It was a most happy idea, and Italy is to be congratulated on having a Government sufficiently enlightened to undertake so good a work, and so many learned sons ready and willing to devote their time and talents to advance the honour of their country. As President of the Geographical Society of a nation which has owed much to Italy, it is alike a duty and a pleasure to offer on the part of my associates, as well as on my own part, our most hearty congratulations to our Italian friends on the completion of their magnificent Colombian enterprise.

THE GEOGRAPHY OF MAMMALS.

By W. L. SCLATER, M.A., F.Z.S.

No. II.—The Australian Region.*

Sect. 1.—Boundaries of the Australian Region.

The Australian Region includes Australia, New Guinea, and the Moluccas, together with all the Pacific Islands and New Zealand. It is divided from the Oriental, the next adjacent region, by a line drawn between the two small islands of Bali and Lombok (called Wallace's Line), and thence through the Flores and Molucca Seas, between the islands of Celebes on the one side, and Sumbawa, Flores, Bouru, Sula, and Gilolo on the other. All the islands westwards of this line (*i.e.* Bali, Java, Sumatra, Borneo, Celebes, and the Philippines) are included in the Oriental Region; while all the islands to the eastwards, from Lombok to Timor, the Moluccas, and New Guinea, are referred to the Australian Region. Besides this, the Australian Region includes all the islands of the Pacific, from the Pelews and Ladrones in the north-west, to the Sandwich Islands in the north-east, the Marquesas in the south-east, and New Zealand and its neighbouring islands in the south-west.

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* Continued from vol. iii. p. 105. Map, p. 96.

The boundaries, as above given, correspond with those laid down by Wallace in his work on Geographical Distribution, with the exception that the island of Celebes has been transferred to the Oriental Region.

Celebes, as Mr. Wallace has fully shown in his 'Island Life' (14), is an anomalous island presenting a very difficult problem. It has, doubtless, relations to both the Oriental and the Australian Regions, but has besides many peculiar forms inhabiting it, which do not seem to connect it with either region. On the whole, however, the evidence of the mammals, at any rate, serves to connect it more closely with the Oriental Region, as will be seen by the discussion of the subject in the chapter dealing with that region.

SECT. 2.—GENERAL VIEW OF THE MAMMAL-FAUNA OF THE AUSTRALIAN REGION.

The peculiarities of the Australian Region are very striking. Within its boundaries are found the only representatives of the lowest and most reptilian of the orders of mammals; these are the egg-laying forms, *Ornithorhynchus*, *Echidna*, and *Proechidna*, which constitute the order Monotremata (12).

Of the seven generally recognized families of marsupials, or "pouched animals," no less than six are entirely confined to the Australian Region, with the exception of two species of phalanger (*Phalanger ursinus* and *P. celebensis*), which have crossed the boundary into Celebes. The seventh family, the *Didelphyidæ*, or true opossums, are found only in the Neotropical Region, whence they have intruded into the southern part of the Nearctic Region.

Of the other mammals, the rodents and the bats are the only orders at all adequately represented in the Australian Region. To the former belong six genera of *Muridæ* (mice), all of which, except the wide-ranging *Mus*, are confined to this region; the only other rodent that occurs in it is the Javan porcupine, which has just crossed the dividing-line between the Oriental and Australian Regions into the islands of Flores and Sumbawa.

The bats of the Australian Region (3) are very numerous, more especially in the islands to the north of Australia, where the tropical conditions are specially favourable to the development of this group. No less than twenty-eight genera, containing nearly one hundred species of bats, are met with within the region, and of these genera eight are not found elsewhere. This is a high percentage, only excelled in the Neotropical Region, which is extraordinarily rich in bats, having no less than forty-two out of forty-seven genera confined to it.

The five other orders of terrestrial mammals—the Ungulata, the Carnivora, the Insectivora, the Edentata, and the Quadrumana—may be considered as practically absent in the Australian Region, though members of several wide-ranging genera have just crossed the line of separation, and are represented in some of the islands on the north of Australia; but, with the exception of the dingo, none of these reach the actual continent of Australia.

The question of the origin of the dingo has not yet been settled. Although fossil remains of this animal have been found in the recent Tertiary deposits, it is difficult to say whether the dingo was introduced into Australia by the aborigines or is indigenous. At the present time it appears to be found both in a wild state and in a semi-domesticated condition among the native Australians.

SECT. 3.—SUBDIVISION OF THE AUSTRALIAN REGION.

The Australian Region may be most conveniently divided into five subregions; these are—

(1) The *Austral Subregion*, containing—The island-continent of Australia, with the dependent island Tasmania.

(2) The *Papuan Subregion*, containing—The islands lying to the north of Australia, including (*a*) the Timor group from Lombok to Timor-Laut; (*b*) the Moluccas, of which the chief islands are Morty, Batchian, Gilolo, Bouru, and Ceram; (*c*) the large island of New Guinea; (*d*) the New Britain group, containing New Britain, New Ireland, the Admiralty Islands, and the Solomon group.

(3) The *Maorian Subregion*, containing—The two islands of New Zealand, together with their outliers Norfolk, Kermadec, and Chatham Islands, as also Auckland, Campbell, and Macquarie Islands.

(4) The *Polynesian Subregion*, containing—The various islands in the Pacific from the Ladrones in the north-west to the Society and Marquesas in the south-east, of which the principal are New Caledonia, the New Hebrides, and the Fiji and Samoan groups.

(5) The *Hawaiian Subregion*, containing — The Sandwich-Island group.

Of these, only the first two, the Austral and Papuan Subregions need be considered in detail, as there are, practically speaking, no mammalian inhabitants, except bats, in the other three subregions.

SECT. 4.—THE AUSTRAL SUBREGION.

The "island-continent" of Australia, as Mr. Wallace terms it, has, as has now been positively ascertained, a large portion of its interior so parched up and barren as to be almost destitute of animal life. But all along the east and south-east coasts, where there is land of sufficient elevation to condense the vapours from the adjoining ocean, more fertile districts are found. Besides the more widely diffused Australian types, some peculiar forms are met with only on this side of the continent. Tasmania, which is, in fact, but a recently separated piece of this portion of Australia, has also a moister and less extreme climate, and contains representatives of many of the special Australian forms, besides some indications of an antochthonous fauna.

The most peculiar mammals of Australia, and those which first claim our attention, are the two forms which together constitute the subclass of monotremes. These are the extraordinary genera *Ornithorhynchus Echidna*, which in their toothless jaws, in the conformation of their sternum and shoulder girdle, and especially in the structure of their reproductive organs, exhibit unmistakable signs of divergence towards the classes of reptiles and amphibia. The first of these, usually known to the colonists as the "water-mole," is entirely aquatic in its habits, and is met with only in the streams and waterholes of New South Wales and Tasmania, where it burrows in the banks, and swims and dives with great facility. The Echidna is more widely distributed, and, as we shall presently see, has also representatives in the Papuan Subregion. It inhabits the scrubs throughout the eastern districts of Australia, and is likewise occasionally found as far along the southern coast as Western Australia. In Tasmania a slightly different species (*Echidna setosa*) with longer fur, almost concealing the spines (by some authors considered to be only a geographical race or subspecies of the typical form), is met with.

After the monotremes, the most important group of mammals, and that which constitutes by far the most prevalent feature of Australian mammal-life, is the great order of marsupials. Although not absolutely restricted to Australia, since one of its component families is purely American, the marsupials, from their prevalence, constitute a still more noticeable feature of the Australian fauna than the monotremes. Of the seven families into which this order is usually divided by naturalists, six are entirely confined to the Australian Region. Moreover, the marsupials are so abundant in Australia proper, as to quite overshadow the few representatives of the higher orders of mammals found within its limits.

The carnivorous dasyures (*Dasyuridæ*) forming the first of these families take the place in Australia of the true carnivora of other parts of the world. They are semi-nocturnal in habits, and prowl about at dusk in search of the smaller mammals and birds which constitute their food. In Tasmania two peculiar forms of dasyures occur, which are not met with in the Australian continent. These are the thylacine, a dog-like animal with a long tapering tail, noticeable as being the largest of living carnivorous marsupials, and in general external appearance so much resembling our familiar domestic friend that the uninitiated can hardly be persuaded that its proper place is in a different order of mammals; and the Tasmanian devil, as it is popularly called—a somewhat aberrant dasyure of a prevailing black colour, about the size and somewhat of the shape of an English badger, and remarkable for its savage and voracious disposition. Both these animals, now confined to the islands of Tasmania, must have formerly extended into Australia, as their remains have been found fossil in the caves of the Wellington Valley of New South Wales. Altogether the dasyures number some twenty species in Australia and Tasmania.

Besides the dasyures, a second type of the same family, but in many respects divergent in structure, is found on the mainland of Australia. This is the *Myrmecobius*, or "native ant-eater," as it is called—a little animal of the size and somewhat of the likeness of the common squirrel, with a long bushy tail and elegant transverse stripes across the back. The *Myrmecobius* is terrestrial in its habits, and feeds principally on ants. It is apparently confined to the western and central parts of the subregion.

The *Peramelidæ*, or bandicoots, the second family of Australian marsupials, have also teeth adapted to an insectivorous diet, although we know, from the records of trustworthy observers, that some of the species feed more or less upon vegetable substances. Such is certainly the case with the root-eating dalgyte (*Peragale lagotis*) of Western Australia, which is abundant over the grassy plains of that colony, and, from its burrowing habits and large hare-like ears, is commonly known as the "native rabbit." Of the typical bandicoots (*Perameles*), five or six species are known, distributed over various portions of Australia, each colony having its peculiar forms. They are all purely terrestrial animals, some inhabiting the densest scrubs, and others the hot stony ridges of the upland plains. The only remaining member of the family *Peramelidæ* is the anomalous pigfoot (*Chœropus castanotis*), a small rat-like animal with slender feet, which is confined to the hard stony grounds of the interior of the southern Australian colonies.

A most interesting discovery has recently been made in the deserts of Central Australia of a new burrowing marsupial, of mole-like habits, for which it is necessary to constitute a new family. This little animal has been described by Dr. E. C. Stirling (9) under the name of *Notoryctes typhlops*, and is apparently very rare. As its name implies, it is quite blind, its eyes being represented merely by pigment-spots buried beneath the skin and muscles; furthermore, its whole structure is admirably adapted for its burrowing life. Full descriptions of both its habits and anatomy will be found in the *Transactions* of the Royal Society of South Australia for 1891.

We now come to the herbivorous marsupials (*Diprotodontia*), of which there are three families, all confined to the Australian Region, namely, the wombats (*Phascolomyidæ*), the phalangers (*Phalangeridæ*), and the kangaroos (*Macropodidæ*).

The wombats are numerically of the least importance of the three families above mentioned, although the form and general appearance of the animals of the single known genus, *Phascolomys*, is hardly less remarkable than that of the kangaroos.

There are three species of wombat generally recognized, one of which is confined to Tasmania; they are clumsy-looking animals, resembling in their form and actions small bears. They never climb trees, but live entirely on the ground or in burrows and holes, feeding on grass, roots, and other vegetable substances. In general structure the wombats are closely allied to the next family, the phalangers, although their exclusively terrestrial habits naturally involve minor points of difference, which, added to the characters presented by their dentition, have induced naturalists to recognize them as a separate family.

The phalangers (*Phalangeridæ*), which next follow, are a much more extensively developed group of animals, presenting us with several well-marked generic forms, and with about twenty-one readily distinguishable species in the Australian mammal-fauna.

While the kangaroos are mostly grazing animals, and the wombats burrowers and grubbers, the phalangers are essentially arboreal in their habits, and are much more strictly nocturnal than the two former groups. In the daytime the phalangers lie concealed in the hollows of trees, issuing forth at night to feed amongst the branches upon leaves, buds, and fruits. The koala, or "native bear" (*Phascolarctos*), of which form a single isolated species only is known, serves to connect the phalangers with the wombats, being allied to the latter by many characters, and amongst others by the absence of a tail, which distinguishes it from the rest of its family. In *Pseudochirus*, *Trichosurus*, and *Dromicia*, the more typical forms of the *Phalangeridæ*, which next follow, the tail is not only well developed, but of vital importance to the animal, being used as a prehensile organ. The flying phalangers of the genera *Petaurus* *Gymnobelideus*, and *Acrobates*, do not employ their caudal appendages in the same way. But this organ, which is much elongated in all these groups, and densely clothed with hair, serves, along with the membrane extended between the fore and hind legs, in the manner of the flying squirrels (*Pteromys*), to support the animal in the air when descending from the top of one tree to the base of another.

One more very singular little animal must be enumerated before we leave the phalanger family—the tarsipes (*Tarsipes rostratus*), small in size, but great in interest, even among the many abnormal forms of this wonderful land. The tarsipes is of the size and general form of an ordinary mouse, but with a long slender pointed muzzle, and with the nails of the toes for the most part embedded in the upper surface of the expanded fleshy pads, with which they are terminated, thus affording some resemblance to the abnormal lemuroid mammal, *Tarsius spectrum* of the Indian Archipelago, whence its name is derived. Another peculiarity of the tarsipes is that its food appears to be exclusively honey, no other substance having been found in the stomachs of the specimens examined, and its long and slender tongue being obviously adapted, like the bill of the humming-bird and the brush-tongue of the lories, for collecting such food.

The kangaroos (*Macropodidæ*) must be considered as *par excellence* the most important group of the Australian mammal-fauna. They are at once the most numerous in species, and in the former condition of Australia, before the influx of Europeans took place, were probably likewise the most prevalent form of mammalian life as regards individuals. In his great work on the mammals of Australia, Mr. Gould has devoted the whole of the second volume to the illustration of members of this family, figuring no less than 44 species. Mr. Thomas, in his recent catalogue of the Marsupialia (12), recognizes 45 species.

These are divided into eleven genera, of which the best known and largest are *Macropus*, *Dendrolagus*, and *Bettongia*. The first of these genera contains the larger kangaroos, in which the upper incisors are of equal length, the canine teeth are deciduous when present, and all the toes of the fore feet are of nearly equal length. *Dendrolagus* includes four species of tree-kangaroos, of which, however, only one is found in Australia, *Dendrolagus lumholtzi* (2, 6) of Northern Queensland, the others being confined to New Guinea. They are remarkable for the fact that the proportionate lengths of the fore and hind limbs, unlike those of the true kangaroos, resemble those of ordinary mammals; they further differ from all other kangaroos in being arboreal in their habits, climbing trees with great facility, and living on bark, fruits, and leaves.

Bettongia and its allied genus *Potorous* embrace the kangaroo-rats, as they are often termed. These are all small, never exceeding a rabbit in size; they possess well-developed canine teeth, and have the central toes of the fore feet elongated to accommodate their digging habits.

Having completed our survey of the monotremes and marsupials of the Australian Subregion, we must now consider the Eutherian series, which, as has been already shown, plays a very subordinate part in this extraordinary fauna. Putting aside the marine mammals—the seals, cetaceans, and sirenians—and confining our attention to the terrestrial groups, we find only three of the usually recognized orders, namely, the rodents, bats, and carnivores, with any representatives in this strange country. And the carnivores would be perhaps better considered as quite external to the fauna of Australia proper, since the solitary member of this group found within its limits is the semi-domesticated dingo, which, as already suggested, has not improbably been introduced by the primitive native inhabitants.

Monkeys, insectivores, and the most useful order ungulates, to which its grassy plains would appear to be and, as we know by actual experience are, excellently adapted, are alike unknown, except as introductions, in Australia, and their functions in a state of nature seem to be performed by the various groups of marsupials.

Of the other orders, the rodents are represented by six genera, all belonging to the mice (*Muridæ*). Of these four are confined to Australia proper, while two others also occur in the Papuan Subregion; the remaining one, the cosmopolitan *Mus*, or true mouse, numbers no less than eighteen species in Australia. The habits of the water-voles of Europe are assumed by the species of the genus *Hydromys*, which are modified for aquatic life (Thomas, 13), while the species of *Hapalotis* are found chiefly in the dry sandy scrubs.

The bats, with one exception, all belong to genera of considerably wide distribution, and the number of species known to inhabit Australia is not very great. Thirty only are described in Dr. Dobson's catalogue of bats as coming thence. *Pteropus*, the great genus of fruit-eating bats, is represented by a few species; so too are the widespread insectivorous genera *Vesperugo* and *Miniopterus*. One species of the former genus, the southern pipistrelle (*V. abramus*), is found almost throughout the Old World, from Sweden to North Australia.

SECT. 5.—ANALYSIS OF THE AUSTRAL MAMMAL-FAUNA.

The full list of the mammalian fauna of the Austral Subregion (7) contains the names of about 169 species, referable to 59 genera. Of these genera 29, just half, are not found outside the Austral Subregion, the greater number of them (twenty-five) being marsupials; they include, however, three genera of mice (*Xeromys*, *Hapalotis*, and *Mastacomys*) and one peculiar bat (*Rhinonycteris*). Thirteen genera are confined to the Australian Region, that is, are found in the Papuan Subregion as well as in the Austral Subregion; of these, again, the majority are marsupials, besides which there are two genera of rodents (*Hydromys* and *Uromys*), and one bat (*Nyctophilus*). Seventeen genera which are found in Australia extend beyond the limits of the region, to the Oriental, and in some cases range even into the Ethiopian and Palæarctic Regions. Of these the greater number (fourteen) are bats; one is a marsupial (*Phalanger*), of which two species are found in Celebes; another is the widely spread genus *Mus*, which is found throughout the Old World; and the last is a carnivore (*Canis*), of which the

Australian representative is the dingo. *Canis* is spread over the whole of the rest of the world, both Old and New.

Turning now to the distribution of the genera within the continent of Australia itself, it will be found that out of 43 genera (of monotremes, marsupials, and rodents), 20 are fairly represented throughout the whole area, 13 are confined to the east (several of these ranging north into New Guinea), 7 are restricted to the western and central parts of the continent (these latter are chiefly desert forms such as *Peragale*, *Chœropus*, and *Notoryctes*), and the three remaining genera are found only in Tasmania. These are *Thylacinus*, *Dasyurus*, and *Mastacomys*.

If now we reconsider the list, counting only monotremes, marsupials, and rodents, it will be found that out of 130 species, 35 range from west to east to a greater or less extent; 49 are confined to the eastern part of Australia, in many cases extending to Tasmania; and 36 are peculiar to Western Australia, while 10 species out of the total mammal-fauna are peculiar to Tasmania.

SECT. 6.—PAST HISTORY OF THE AUSTRAL SUBREGION.

The past history of the Australian mammals is still very obscure; the only remains of extinct species yet discovered have been found in certain bone-caves and in surface-deposits generally attributed to the Pleistocene age.

Putting aside the dingo, all the Pleistocene mammals of Australia belong to the monotremes or to the marsupials, and, with two exceptions, can be accommodated in still existing families. These exceptions are *Nototherium* and *Diprotodon*, the latter of which was a very large animal, equalling a rhinoceros in bulk: but both were probably allied to the existing kangaroos.

Recently a deposit containing bones of these and other large marsupials has been found in a dry salt lagoon, called Lake Mulligan, in South Australia, and when these remains have been worked out, a great deal more information may be expected as regards this pliocene or pleistocene fauna. As in South America, these extinct animals appear in many cases to have attained a size far surpassing that of their degenerate descendants.

None of the remains hitherto found in Australia throws any light on the origin of its remarkable fauna. But quite recently evidence of an extensive mammalian fauna has been discovered in certain beds, of probably Upper Eocene age, near Santa Cruz, in Patagonia. In addition to a number of other forms, this series contains remains of a large proportion of marsupials, and though the most prominent of these forms belong to the *Didelphyidæ*—the marsupial family now confined to America, and apparently distributed over the whole northern hemisphere during Tertiary times, but not found in Australia—a certain number of them show an Australian stamp. Some of them have even been relegated by

Ameghino (1), to whose researches our knowledge of the Santa Cruz fauna is mainly due, to the existing Australian family *Dasyuridæ.*

If, on further investigation, these references are found to be correct, the inference would seem to be that in very remote times—probably in the early Tertiary or the late Secondary Period—there has been some sort of land connection between South America and Australia. In such case there would be no necessity to suppose that Australia was ever directly connected with the rest of the Old World at all, none of the peculiar forms of Australian marsupials having yet been detected in any other part of the globe.

Besides the common possession of marsupials, many other resemblances between the faunas of Australia and South America have been pointed out to occur among the birds and amphibians, and especially among the fishes. Two families of freshwater fishes (*Galaxiidæ* and *Haplochitonidæ*) are found exclusively in these two regions, and are not known to occur elsewhere.

Apart from speculation, however, there is no question that Australia has been isolated from all the other continents since the end of the Secondary, or at least since the beginning of the Tertiary, Period of geological time.

SECT. 7.—THE PAPUAN SUBREGION.

In contrast to Australia, the great island of New Guinea, or Papua, is traversed throughout by mountains of high altitude. The rivers rising in these ranges, aided by the suns of the tropics, produce a luxuriant vegetation, and such a country as we should suppose would be especially favourable to mammal life. Yet mammals are by no means abundant in New Guinea and the adjacent islands which constitute the Papuan Subregion. As is the case in Australia, the greater number of the indigenous animals of New Guinea and the neighbouring islands consist of monotremes, marsupials, and rodents, together with a certain number of the cosmopolitan order of bats (8, 10, 11).

Of the monotremes, two species have been met with in New Guinea, both of them belonging to the family of echidnas above referred to. Of these one species, only at present known from the south of New Guinea, is but a slightly modified form of the small Australian echidna. But in the mountains, in various parts of New Guinea, has been lately discovered a larger representative of the same order (*Proechidna*), which moreover, differs from the typical form in having only three toes on its fore limbs, and in other particulars.

The Papuan marsupials, as yet discovered, are about thirty-three in number, and embrace representatives of the dasyures, bandicoots, phalangers, and kangaroos, which are also characteristic families of the Australian mammal-fauna.

There are only two genera of marsupials peculiar to the Papuan region. One of these is ***Distachurus***, a small mouse-like animal belonging to the family of phalangers, and remarkable for its long tail, which bears at its tip a double row of hairs on either side, and thus resembles a feather. The other genus is ***Dorcopsis***, containing three species of animals somewhat nearly allied to the true kangaroos. A third genus (***Dendrolagus***), containing kangaroos, specially modified for arboreal life, was formerly supposed to be peculiar to New Guinea. But a species of the same form, as already mentioned, has been ascertained of late years to exist in Northern Queensland also, thus giving further proof of the similarity of the Papuan and Austral mammal-faunas.

Nearly all the marsupials found in the Papuan Subregion are confined to the island of New Guinea; a few, however—for example, the phalangers—also inhabit the other islands of this subregion. The common grey cuscus (*Phalanger orientalis*) extends from Amboyna in the Moluccas and from Timor all across New Guinea, and as far east as New Britain and the island of San Christoval in the Solomons. As regards the remaining orders of mammals, a few scattered representatives of the higher forms (Ungulata, Insectivora, and Carnivora) are found in the islands of the Papuan Subregion. Some of these have, undoubtedly, been introduced by the Malays from the neighbouring islands of the Oriental Region; but others have been described by naturalists as peculiar species. In the latter case, if we assume that the specific distinctions have been satisfactorily established, it is not probable that such species have been brought into the Papuan Region by the hand of man. It is more likely that they have migrated into it at an earlier period, since a considerable lapse of time is necessary before the effects of isolation can produce a new race of sufficient distinctness from the original form to be entitled to specific separation. As regards the Papuan ungulates, several kinds of wild swine (***Sus***) are stated to be met with in the Papuan Region. How far these differ from one another, and whether they are really distinct from the allied wild pigs of the Oriental Region, seems a little uncertain. It is probable, however, that many of these so-called "species" of wild pig may be descendants of the domestic animal, which has run wild, as is well known, in many of the Pacific Islands. The other representatives of the order Ungulata found in the Papuan Subregion are three species of deer belonging to what is termed the Rusine group of the genus ***Cervus***. Two of these deer are confined to Timor and the Moluccan group of islands respectively. All three are closely allied to the Javan deer (*Cervus hippelaphus*), and it is quite possible that they are merely dwarfed forms of this species.

Passing over, for the present, the rodents and bats, the Carnivora are represented in the Papuan Region by three species. These are a cat (*Felis megalotis*), of which very little is known, but which is stated by Mr. Jentink to be quite a distinct species, and to be confined to the islands of Timor and Rotti; a palm cat (*Paradoxurus hermaphroditus*), and a civet (*Viverra tangalunga*). Of these two last the palm-cat is found in both the Moluccas and the Timor group, the civet only in the Moluccas. These two animals have in all probability been introduced by the Malays, since they are frequently kept by them as pets in captivity.

The order Insectivora is represented in the Papuan Subregion by about five species of small shrews (*Crocidura*), but so far as is yet known these occur only in the Moluccas and in Timor, and do not reach further east. Lastly, two species of monkey just enter the margin of the subregion, namely, the common macaque (*Macacus cynomolgus*), very widely distributed throughout the Oriental Region, which has crossed "Wallace's Line" into Flores and Timor; and the black ape of Celebes (*Cynopithecus niger*), which has passed the narrow straits between that island and Batchian, one of the Molucca group.

The rodents are represented in the Papuan Subregion by a considerable number of rats and mice of the family *Muridæ*, all of them restricted to the subregion. One of these, remarkable for its peculiar and probably prehensile tail, is found only in the mountains of New Guinea, and has been placed in a new genus (*Chiuromys*). Among the rodents also there is one very obvious intruder from the west; this is the Javan porcupine (*Hystrix javanica*), which in this subregion is found only in Timor, but is very widely distributed thoughout the Oriental Malayan Islands.

Finally, the Papuan Subregion, with its luxuriant vegetation and tropical forests, seems to be extremely favourable to the presence of bats, of which there are more than 60 species known to occur within its limits. More especially is this the case with the large fruit-eating bats of the genus *Pteropus*, since about 20 out of the 40 known species of this genus are found within this subregion. This genus (*Pteropus*) has an extraordinary area of distribution, which it is difficult to account for satisfactorily. Its range extends from Madagascar and the neighbouring Mascarene Islands through the Seychelles to India, Ceylon, Burma, and the Malayan Archipelago, and includes even Southern Japan; thence it is continued over all the Papuan Subregion into Australia and most of the Polynesian Islands. This genus, it may be noted, seems to have a special propensity to peculiar development in insular areas. Out of about 40 species of *Pteropus* as yet known, only two (*Pteropus medius* from India, and *Pteropus edulis* of the Malay Peninsula) are found on the main continental mass; all the other species are confined to islands, and in many cases to very small limits. For instance, one species (*P. livingstonii*) is restricted to the Comoro Islands in the Indian Ocean, three others to single islands in the Solomon group, and a fourth is only known from the island of Lombok.

SECT. 8.—ANALYSIS OF THE PAPUAN MAMMAL-FAUNA.

The number of genera of mammals represented in the Papuan Subregion is 50; of these 8 are restricted to the subregion (namely, *Proechidna*, *Distœchurus*, *Dorcopsis*, *Chiruromys*, *Pteralopex*, *Nesonycteris*, *Melonycteris*, and *Anthops*). There are also 12 genera, nearly all marsupials, common to the Papuan Subregion and Australia; and 16 genera common to the Papuan Subregion and the Oriental Region. Of these, however, only 6 (*Sus* and 5 genera of bats) penetrate so far eastwards as New Guinea; the other 10 are stragglers over "Wallace's Line" as far as the Timor group and the Moluccas only. Thirteen genera (*Phalanger*, *Mus*, and 11 genera of bats) are found in both the Oriental Region and the Papuan and Austral Subregions.

SECT. 9.—THE MAORIAN SUBREGION.

The Maorian Subregion includes, besides New Zealand proper, many smaller groups of islands in the sea around, such as Norfolk Island, the Kermadec group, Chatham Island, Stewart Island, Auckland Island, Campbell Island, and Macquarie Island, and probably Lord Howe's Island, though in some respects this appears to belong rather to the Australian mainland than to New Zealand.

As in the Polynesian Subregion, there are no indigenous terrestrial mammals found in this Subregion, the only exception being a species of rat (*Mus maorium*). But it is quite possible, nay, probable, that this rat, as its name seems to imply, was brought by the invading Maoris into New Zealand from Tonga, or from wherever the Maoris originated; indeed, Mr. Thomas believes it to be identical with a Polynesian species, *Mus exulans* (cf. Buller, *Trans. N. Z. Inst.*, xxv. p. 49). The only two bats recorded from New Zealand are *Mystacina tuberculata*, the species as well as the genus being both restricted to New Zealand; and *Chalinobus morio*, which is also found in Australia.

The islands of New Zealand are indeed remarkable as being the only insular area on the globe, of any considerable size, which are entirely destitute of mammal-life. All the other large islands of the world possess a mammal-fauna of greater or less richness, related to the continent to which they are nearest, and have consequently been termed by Mr. Wallace "continental islands." All such "continental islands" are separated by narrow seas, of no great depth, from their respective continents. New Zealand alone, of all the larger islands of the globe, is disconnected by a considerable breadth of ocean (about 1400 miles) and also by a deep sea (more than 2000 fathoms) from the nearest point of mainland.

This fact and the absence of an indigenous mammal-fauna show that New Zealand has not been joined directly by land with Australia recently, even in a geological sense of that term; possibly it has never been so connected at all.

To determine, therefore, the geographical affinities of this subregion, we must turn to the birds and to the other lower groups, and so endeavour to gain an idea of the affinities of these interesting islands. In New Zealand the want of mammals has been apparently supplied in former epochs by the great development of two families of flightless birds. One of these groups, the kiwis (*Apterygidæ*), is still represented by five or six species, although these birds are being rapidly exterminated by the British colonists. The other group, the moas (*Dinornithidæ*), are now quite extinct, but as remains of their skin and feathers have been found in some of the caves of the Southern Islands, and as the ancient legends and songs of the Maoris contain unmistakable references to them, it is probable that they have ceased to exist only within the last few hundred years.

In addition to the flightless birds, recent and extinct, New Zealand still possesses two very singular forms of parrots (*Nestor* and *Stringops*), for the reception of which special families have been formed; and eighteen other peculiar genera of land-birds, most of which are related more or less remotely with Australian forms. Altogether there are in New Zealand 57 land-birds, belonging to 34 genera, of which 16, or nearly half, are not known elsewhere. There are also five peculiar genera of waders and aquatic birds in New Zealand, making 21 indigenous genera in all. Among its few reptiles, also, New Zealand numbers the very remarkable tuatera (*Sphenodon punctatus*), which, though externally resembling a lizard, differs from all other lacertians in so many points of its skeleton and internal structure that it is usually considered to belong to a separate and distinct order of reptiles. The nearest allies of this form are found among three extinct families which make up the order *Rhynchocephalia*. Remains of these families occur in beds of Permian age in Germany, in the Keuper of Elgin (Scotland), and in the (probably contemporaneous) Gondwana beds of India, as likewise in the lower Eocenes of North America and Northern Europe.

All these facts indicate a great amount of individualism in the Maorian Subregion. But on the whole they betray an affinity to the tropical parts of Australia and to the Papuan Subregion rather than to the temperate portion of Australia, to which New Zealand is now nearest in point of actual distance. This connection is further confirmed by the soundings of the seas round the islands, which show that, although on the west, south, and east deep water extends all round, a long submerged bank, with a depth of less than a 1000 fathoms, stretches along to the north-west, and connects the shallow waters round Australia with those round New Zealand.

It is probable that the land connection between the two areas, if it ever actually existed, took place somewhere along this line.

As already mentioned in the first article of this series, some writers on Geographical Distribution, especially Professor Huxley and Professor Newton, are inclined to give to New Zealand and its islands the rank of an independent region among the primary divisions of the globe. There is, no doubt, as has just been shown, a good deal to be said for this proposal; but, on the other hand, there are even more valid reasons for retaining New Zealand as a subregion of the Australian Region. In the first place, we are here dealing with mammals alone, and it seems rather absurd to assign the value of a primary region to a group of small islands characterized by the almost entire absence of that class of animals with which we are most concerned. In the second place, looking at regions from a more general point of view, there is a great practical convenience (as Mr. Wallace has pointed out) in keeping the more or less equal divisions of the globe as primary divisions. It seems, therefore, to be quite unnecessary to elevate so small a portion of the world into a primary region. Other small insular areas might, with some justice, put forward nearly similar claims. In the third place, although New Zealand possesses no indigenous terrestrial mammals, yet the fauna, such as it is, shows an unmistakable affinity of various degrees to that of Australia, and more especially to the tropical part of that continent. It is, indeed, probable that the whole of the fauna of New Zealand has been originally derived from that source, although in the greater number of cases it has undergone considerable modification.

Mr. H. O. Forbes (4) has lately put forward a speculative article on the former existence of a (now mostly submerged) southern continent, the remains of which are represented by the land round the South Pole, while former arms stretched upwards and embraced New Zealand, Eastern Australia, Tasmania, Madagascar, the Mascarene Islands, and part of South America. The grounds for this bold assumption, which, although by no means new, has not been previously developed to so great an extent, rest chiefly on the finding of the remains of a large ocydromine rail in the Chatham Islands, allied to the now extinct *Aphanapteryx* of Mauritius, and the fossil bones of a large coot (*Fulica*) allied to *F. newtoni* of the same island. Other evidence adduced is that of the occurrence of the *Ratitæ*, or struthious birds, in New Zealand, Australia, Madagascar, and Patagonia. But the distribution of struthious birds is probably to be explained much in the same way as the distribution of other archaic forms, such as the lemurs and tapirs. They are remnants of what were once more widely spread groups. That this is likely to be the case is shown by the recent discovery, in other parts of the world (such as the Sewaliks of India, and the Eocenes of England and France) of the remains of other extinct ratite birds.

Another piece of evidence brought forward by Mr. Forbes is the occurrence of *Didunculus* in the Samoan group, and of the dodo (*Didus*), to which *Didunculus* was once supposed to be nearly related, in Mauritius.

But it is now known that *Didunculus* has little or no affinity to the dodo, and that it is in fact a mere strongly modified member of the family Columbidæ.

Mauritius, as a matter of fact, is in every way a very typical oceanic island, and there seems to be little evidence, either physical or zoological, of its having been ever connected with any other land.

SECT. 10.—THE POLYNESIAN SUBREGION.

The Polynesian Subregion includes all the numerous and scattered island groups of the Pacific, from the Ladrones and Carolines in the west to the Marquesas in the east, with the exception of the Sandwich Islands, which, owing to their many peculiarities, must be kept apart as a separate subregion.

There is very little to be said concerning the Polynesian Subregion so far as mammals are concerned. As is always the case with oceanic islands—that is, islands that do not seem to have ever been directly connected with any of the great land masses of the globe—the mammal-fauna of Polynesia is practically non-existent, the only exception being a certain number of bats, which are creatures able to traverse the intermediate sea-areas, and so more resembling birds than ordinary mammals in their distribution.

There are, however, besides the bats, three species of the cosmopolitan genus *Mus* (mice and rats), recorded to occur in Polynesia, whether truly indigenous or the modified descendants of introduced species it is impossible to say.

Of the eleven species of bats which have been registered as Polynesian, eight are peculiar to the subregion, two extend into Papua, and one ranges even as far as the Oriental Region.

But, looking to the extreme poverty of the mammal-fauna, it is evident that, to ascertain the general character of the subregion, we must turn to the birds. These, as shown by the excellent summary of Polynesian ornithology recently compiled by Mr. Wiglesworth (15), are, considering the number of islands, not numerous, but on the whole show distinctly Australian affinities.

SECT. 11.—THE HAWAIIAN SUBREGION.

The Hawaiian Subregion includes only the Sandwich Islands. This group of islands is situated in the northern part of the Pacific Ocean, and is very isolated, not only from the great land-masses of Asia and America, from which it is separated by a very deep ocean more than 2000 miles across, but also from the other larger groups of the Polynesian islands, such as Samoa and the Marquesas, from which it is parted by about the same distance.

The larger islands composing the group are seven in number, all of purely volcanic origin.

As would be naturally expected, there are no indigenous land-mammals in the Hawaiian Subregion, but a single species of bat (*Atalapha semota*) occurs there. This bat belongs to a genus found in America, and has, no doubt, reached the Sandwich Islands from that continent. The birds, however, to which we must turn for a moment in order to gain some idea as to the composition of the Hawaiian fauna, show extreme specialization. The greater number, not only of the species but even of the genera of this subregion, are peculiar and wholly restricted to these islands. It is, of course, among the smaller land-birds (*Passeres*) that this individuality is most marked; but even in the other groups, where the distribution is generally wider, the Hawaiian birds are, in many cases, local. We shall, however, be able to form a better general idea upon this subject when Mr. Scott Wilson's new work on the Hawaiian Avifauna (16), now in process of issue, has been brought to a conclusion.

As is the case with the birds, so with the land-shells, which have been carefully studied by the Rev. J. T. Gulick, a wonderful specialization is found in the Hawaiian fauna.

There are, therefore, ample grounds for making a separate subregion for this remote island group, notwithstanding its small size and the complete absence of mammalian life.

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NOTE ON THE R.G.S. MAP OF TIBET.*

By **GENERAL J. T. WALKER, R.A., C.B., F.R.S., Late Surveyor-General of India.**

The map of Tibet which is now published has been under compilation in the office of the Geographical Society for several years. Portions have been published from time to time on various scales, to illustrate the reports of various travellers in this region which have been sent to the Society and read at the evening meetings. The publication of the map as a whole has been frequently delayed, in order to permit of the incorporation of new work, and the correction of old work as fresh materials became available from time to time. The map now contains all the latest information, which the scale ($\frac{1}{3800000}$, or 60 miles = 1 inch) is sufficiently large to show.

The materials on which it is based have been derived from the following sources:—

On the south, the information has been wholly taken from the Trans-Himalayan operations of the native explorers attached to the Indian Survey, notably Pundits Nain Singh and Krishna, whose explorations were published by the Society shortly after they were made. Nain Singh explored the Tibetan sources of the Indus, and a considerable portion of the upper course of the Yaro Tsanpo, or Brahmaputra river, in the years 1865-67, and in 1874-75 he explored a line of country stretching from west to east about 2° north of his previous work, from the eastern frontier of Ladakh to the Tengri-Nor Lake, and thence southwards to Lhasa. He eventually returned to India by a route over the eastern Himalayas, and through Bhotan into Assam.

Krishna, in the years 1879-82, took a line of exploration from Lhasa northwards into the Tsaidam plateau, along a route part of which had been taken by the Russian explorer, Prjevalski, in his attempts to reach Lhasa from the north; he then struck northwards to Sachu, or Saitu, in the plains of Mongolia to the north-east of Lob Nor. Returning to Tsaidam, he made his way through Eastern Tibet to the town of Darchendo, or Ta Chien Lu, which is situated on the high-road between Lhasa and Peking, and on the border-line between Tibet and China. He then turned westwards back to India, and, travelling *viâ* Batang, reached Sama in the Zayul valley of Tibet, not far from eastern Assam; but, being unable to pass through the wild tribes inhabiting the intervening hills, he took a very circuitous route, northwards and westwards *viâ* Dongsar, Jithog, and Arig, to the vicinity of Lhasa, and then turned southwards and crossed the Himalayas into India. Krishna's route up to Tsaidam and thence down to Ta Chien Lu and Sama, and up again to the vicinity of Lhasa, has been adopted throughout; but for the country from Tsaidam northwards up to Sachu, the work of Messrs. Cary and Dalgleish has been taken in preference.

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* Map, p. 96.

All the details to the west of the meridian of 82° have been taken from the maps of the Indian Survey.

The Khotan-Tarim river down to Chigalik and Lob Nor, the route from Chigalik over the Altyn Tagh and Chamen Tagh ranges to Bagh Tokai, and thence down to the Naichi valley in southern Tsaidam, and finally the route up to Sachu in Mongolia, are taken from the maps of Messrs. Cary and Dalgleish.

The Kuen Lun range between the meridians of 80° and 91°, and its lakes and northern spurs, have been taken from a Russian map by Pevtsof.

The Kuen Lun range between the meridians of 91° and 101°, together with some of the country to the south, and the Nan-Shan range of Mongolia to the north, have been taken from the last edition of Prjevalski's travels, published in St. Petersburg in 1888.

The route from Lob Nor to Sachu, and thence over the Ping Davan and Yangi Davan pass, and on to Lake Koko Nor across the plateau which lies to the south of the Nan Shan range, has been taken from the recently published map of Mr. St. George Littledale (see *Geographical Journal*, vol. iii. page 540).

A route from west to east across the Chang-tang of Tibet, lying to the north of Nain Singh's route of 1874–75, and stretching from north-eastern Ladakh into the region to the north of Lake Tengri Nor, has been taken from the map of Captain Bower's Survey in 1891.

A route between the meridians of 89° and 91°, from the Lob Nor country down to the neighbourhood of the Tengri Nor, has been taken from the map published by M. Bonvalot and Prince Henri of Orleans.

Information has been obtained from Mr. Rockhill's two journeys into Tibet from points on the north-east in the neighbourhood of Lake Koko Nor: the first was by way of the lakes Charing Nor and Oring Nor, near the sources of the Hoang-Ho river, to Jyekundo, and thence to Ta-Chien-Lu; the second was through Southern Tsaidam and over the Kokoshili and Dangla ranges down south to latitude 32° by longitude 90° 20′.

The country between the parallels of 31° and 32°, and the meridians of 90° to 98°, and thence on to Batang, has been compiled from the surveys of Captain Bower and Mr. Rockhill, with a few additions from the map published by M. Bonvalot and Prince Henri of Orleans.

A considerable portion of the very elevated region of Chang-tang, which lies between the Kuen-Lun range and the route taken by Captain Bower, is shown as a blank. Russian maps show ranges of hills on this tract which may possibly exist, but are as yet purely conjectural. Thus a blank, with the word "unexplored" printed across it, has been adopted as at present preferable.

As regards the values of the co-ordinates which have been adopted for the construction of this map, to the south and west they have all been derived from the Indian Survey. Elsewhere several latitudes have been determined astronomically by various explorers, which are sufficiently accurate for the purposes of a map on a small scale. The longitudes are less reliable, having, without exception, been deduced from the traverses of the routes.

The longitude of Sachu or Saitu in Mongolia may be taken as an obligatory point. The value adopted for this map is 94° 54′ east of Greenwich, which is the revised value given by Prjevalski in the map accompanying the account of his fourth exploration into Central Asia. Other values are as follows:—

Prjevalski, by his second and third explorations	94° 26′
Krishna, after correction for magnetic variation	94° 23′
Cary and Dalgleish	94° 48′
Littledale	94° 49′
Kreitner, with Count Széchenyi's expedition	94° 58′

The longitude of Darchendo or Ta Chien Lu, on the extreme east, may be taken as another obligatory point. The adopted value is 102° 12′.

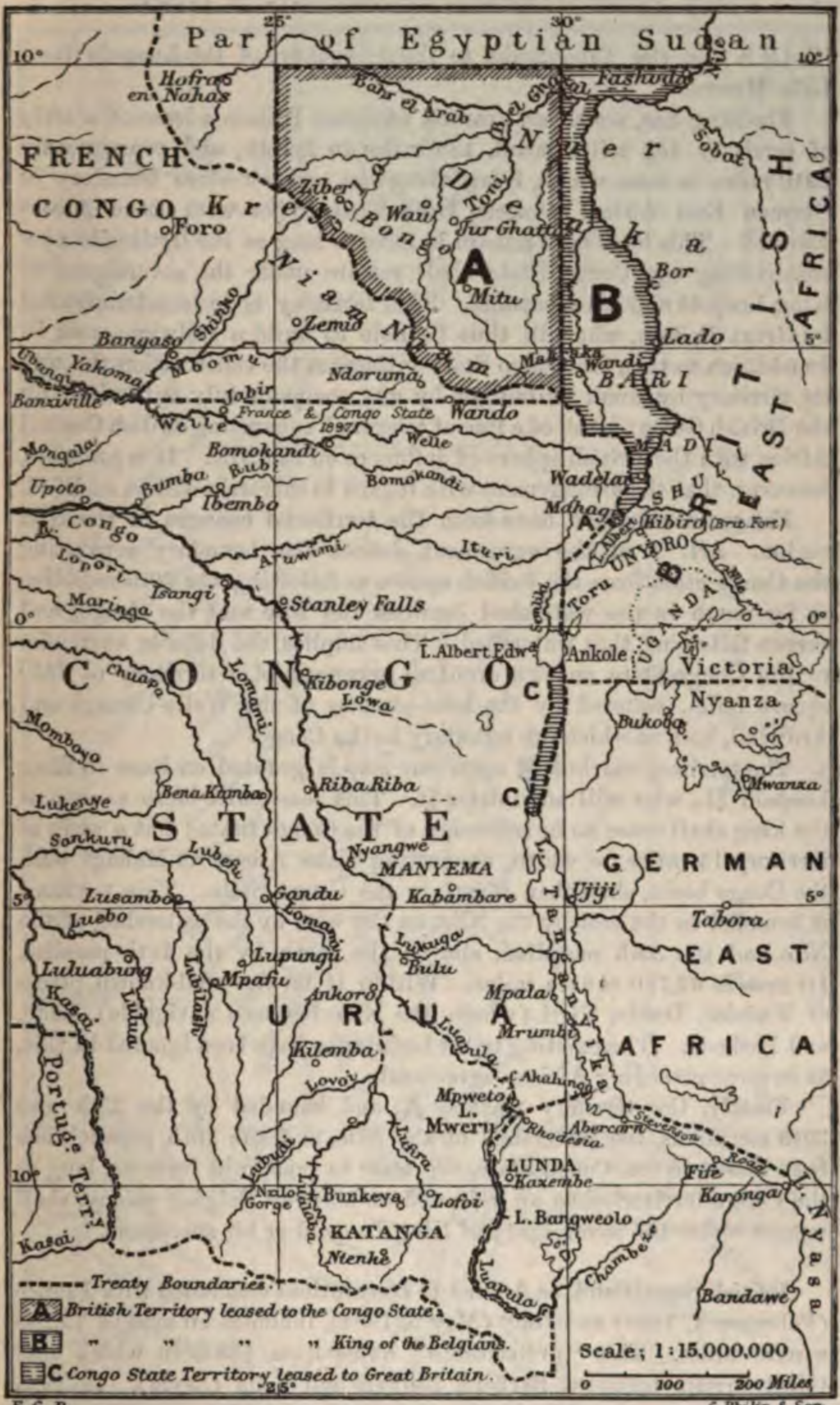
Krishna's work gives	102° 15′
Kreitner's	102° 5′
Baber's	102° 18′

THE RECENT TERRITORIAL ARRANGEMENTS IN AFRICA.

By E. G. RAVENSTEIN.

We present the readers of the *Journal* with two sketch-maps designed to illustrate the territorial changes in Africa which have been brought about by the agreements concluded on May 3 at Rome and on May 12 at Brussels. The agreement with King Leopold, as sovereign of the "Independent Congo State," is interesting on account of the novel political "leaseholds" which it creates. It deals with territories covering 209,350 square miles, of which 175,530 square miles are leased to King Leopold, whilst 16,910 are assigned to Great Britain.

In the extreme south the Congo State definitely withdraws its pretensions to 14,000 square miles of territory lying between Lake Bangweolo and the Luapula. The line separating British Central Africa from the Congo State is to be drawn from Cape Akalunga



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MAP TO ILLUSTRATE THE ANGLO-CONGO ARRANGEMENT.

(5° 15′ S.) on the Tanganyika to the debouchure of the Luapula from Lake Mweru.

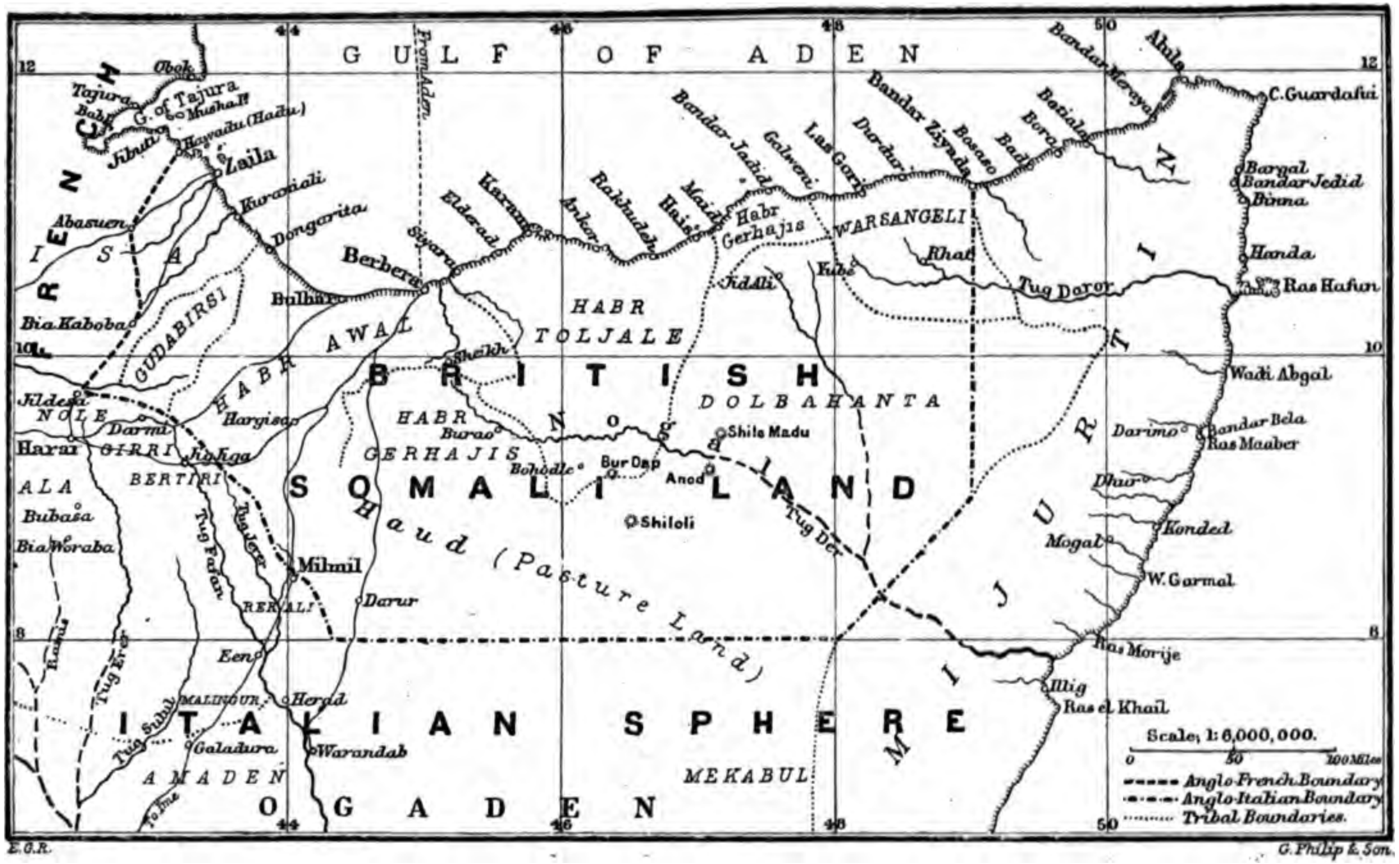
The king has, moreover, granted to Great Britain a lease of a strip of territory 15½ miles broad, 188 miles in length, and consequently 2910 miles in area, which, lying along the north-western boundary of German East Africa, connects Lake Tanganyika with Lake Albert Edward. This lease is to remain in force so long as the territories now constituting the Congo State shall remain under the sovereignty of King Leopold and his successors. This territory is to be administered by Great Britain, who will thus be able to build a railway across it. In addition to this, the Congo State authorizes the construction through its territory by Great Britain, or by any company duly authorized by the British Government, of a line of telegraph connecting British Central Africa with the British sphere of influence on the Nile. It is probable, however, that the arrangement with regard to this strip will be modified.

Far more extensive have been the territorial changes in the Nile region. Art. 1 of the agreement defines the boundary separating the Congo State from the British sphere as following the 30th meridian as far north as the watershed between the Nile and the Congo, and thence following that watershed. This implies the definite surrender to the Congo State and its eventual successor of a territory of 9950 square miles, watered by the head-streams of the Welle-Ubangi and Aruwimi, both of which are tributary to the Congo.

The territory marked **B** upon our map is granted on lease to King Leopold II., who will administer it. This lease will lapse as soon as the king shall cease to be sovereign of the Congo State; but a strip of territory 15 miles in width, connecting Lake Albert at Mahagi with the Congo basin, shall then revert to the Congo State. This territory is bounded on the east by the Nile, on the west by the watershed of the Nile and the 30th meridian, and on the north by the 10th parallel. Its area is 42,790 square miles. Within it lie the well-known places of Wadelai, Dufile, Kirri (where the Nile becomes navigable), Lado, and Fashoda. The existing tribal boundaries have been ignored in this, as in most preceding African agreements.

Finally, the territory marked **A**, and bounded by the 25th and 30th meridians, the watershed of the Nile, and the 10th parallel, has been leased to the Congo State, the lease to remain in force so long as the Congo territories, as an independent state or Belgian colony, shall remain under the sovereignty of King Leopold or his successors.

British Somaliland, as defined in conventions concluded with France (February 1, 1888) and Italy (May 5, 1894), includes an area of 75,200 square miles. This "protectorate" dates from 1884, in which year Great Britain occupied Berbera, Bulhar, and Zaila (Zeyla). In 1885 treaties were made with the Isa, Gadabirsi, and Habr Awal; and by



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MAP TO ILLUSTRATE THE ANGLO-ITALIAN ARRANGEMENT.

an Order in Council, dated December 19, 1889, a protectorate was proclaimed over the whole coast, extending from Ras Jibuti, at the mouth of the Gulf of Tajura, to Bandar Ziyada. In 1887 Great Britain recognized the French protectorate over Obok and Tajura, to the west of Ras Jibuti, and ceded the Musha Islands. According to an agreement concluded in 1888, the boundary separating the British and French protectorates begins at the wells of Hadu, on the coast between Jibuti and Zaila, and runs by way of Abasuen, Bia Kaboba, and Jildesa, in the direction of Harar. That important commercial town, since 1887 occupied by Menelik, the Emperor of Ethiopia, was not to be annexed by either France or Great Britain, both retaining the right of opposing attempts on the part of any other power to acquire or assert any right over the town. Great Britain has now waived this right in favour of Italy, for the boundary agreed upon commences at Jildesa, passes to the north or east of Darmi Jig-jiga and Milmil, then follows the 8th parallel to 48° E., and ultimately reaches the coast in 49° E., near Bandar Ziyada. The territories of the Girri, Bertiri, and Rer Ali in the west, of the Ogaden in the south, and of the Mijurtin in the east, are assigned to Italy, whilst a portion of the Isa, the Gadabirsi, the Habr Awal, the Habr Gerhajis, the Habr Toljale, the Warsangeli, and Dolbahanta live within the British protectorate. Italy claims Harar as a dependency of Abyssinia, over which she assumed a protectorate duly notified to the powers in 1889, in accordance with Art. 34 of the "Act" of Berlin. At the same time, it should be borne in mind the Emperor Menelik in 1891, and again in 1893, denounced that article of the treaty of September, 1889, which placed the conduct of the foreign relations of his empire in the hands of the Italian Government.

THE MONTHLY RECORD.

EUROPE.

Vestiges of Village Communities in England.—Mr. H. T. Crofton, in a paper published in the last number of the *Manchester Geographical Society's Journal*, shows how the irregular boundaries of existing townships and even of counties in England were created by the demands of the pre-Roman village communities. The later manors perpetuated or only slightly altered the boundaries, which gradually acquired permanence. A superficial study of the 6-inch Ordnance Survey map discloses the fact that counties frequently have scattered portions cut off from the main mass, and this is more especially the case with townships and parishes. In a few cases this may be accounted for by the changing course of rivers. Along the course of the formerly widespread Mersey, portions of Lancashire and Cheshire are found on what may be called the wrong side of the river, simply because the river has changed its course. But the usual explanation of such features must be the habits of early peoples in their separate divisions of the family, the tribe, and the nation. The village community existed in Celtic times, before the advent of the Romans. It is known that among the lower classes it was customary for the youngest son to inherit the homestead; among the upper classes all had equal rights to the strips of arable and pasture lands, which were not broken up. These strips of arable land were divided by unploughed ridges of grass called *bylands*, while across the end of the furrows was a *headland* ploughed at right angles to the rest; these are features which it is well to remember in searching after vestiges of village communities. The measurements varied in different districts; they were purely local standards dependent on the height of the tallest man in the village. By 1340 A.D. a transition took place in the system of holding the strips of land; they now began to be held permanently, and ultimately the strips were enclosed. Mr. Crofton illustrates his arguments from the manor of Withington, 4 miles south of Manchester, where the conflicting claims of the inhabitants have produced a broken and scattered condition of the boundaries. No doubt the townships were for long surrounded by uncultivated portions of land, and as the villages increased in number they were led to take more and more of the borderland into cultivation, the claims of the village communities being possibly adjusted by the lord of the manor. It is very important that local geographers should take up the further study of this subject at once, before parochial boundaries are so far reformed as to destroy the clues which still remain in their complex boundaries. No more useful research into the evolution of political geography in this country could well be found, but the student must set to work cautiously, and will require to have at the outset a good historical knowledge of primitive habits, and, before he formulates his conclusions, a practical acquaintance with the country.

Ethnography of the Aran Islands.—At the last meeting of the British Association attention was directed to the importance of a systematic Ethnographic Survey of the United Kingdom. Professor N. C. Haddon and Dr. C. R. Browne of Dublin have recently prepared for the Royal Irish Academy (*Proceedings*, 3rd series, vol. ii. No. 5) an exhaustive study of the Aran Islands, which is intended as the first of a series of studies in Irish ethnography. These islands, which lie in the mouth of Galway Bay, about 28 miles west of Galway harbour, are three barren masses of limestone rock, thickly strewn with large ice-worn erratic boulders of granite and sandstone from Connemara. The total population is nearly 3000. The inhabitants of an island do not marry outside it; consequently little fresh blood is introduced, and there is considerable facial resemblance among the natives. They are well made, of good stature, with grey or blue eyes, and usually dark brown hair. The general facial type has been described as an exaggeration of the Gaelic. The authors made a large number of anthropometric measurements, which are given, together with typical photographs. The data thus collected lead them to dissent from the opinion that the Aranites are descendants of the Firbolgs, a small, swarthy, dark-haired people, held to be of Thracian origin. The chief antiquities of the islands are the well-known pre-Christian duns or forts. Cloghans, or beehive stone huts, are common. Primitive customs and beliefs abound. Offerings are regularly made at sacred wells and other holy places. The skin of the seal is used as a preventive against gout and colic. The belief in the evil eye is almost universal. Stone anchors are still in use, and querns have been employed until quite recently. An excellent bibliography completes a valuable paper.

Ethnography of South-East Hungary.—The 'Abrégé du Bulletin de la Société hongroise de Géographie' (xxii. année, 10 numero, Budapest) consists of a monograph on the Hungarian population of Torda, Aranyosszék, and Toroczkó, abridged from the larger work of Dr. Johann Janko. It is very similar in scope to Professor Haddon's paper on the Ethnography of the Aran Islands, but there is less attempt to co-ordinate the abundant data collected. The region in question forms part of the province of Siebenbürgen, and is roughly bounded by the

Bihargebirge on the west, on the south by a line drawn from this range to Nagy-Enyed, on the south-east by the Maros, and north by its tributary the Aranyos. The Wallachian elements in the population are not considered. Full anthropological and anthropometrical details are given, and a minute comparative account of the prevalence of surnames, distribution of trades, and of the food, clothing, and structure of houses, etc. The most interesting portion of the paper, dealing with betrothal, marriage, baptismal and funeral customs, is too long and detailed to be summarized here.

Subterranean Explorations in the Dalmatian Alps.—In the *Comptes Rendus* of the Paris Geographical Society (1893, p. 432), M. Martel reports on his mission for the scientific exploration of the grottoes and underground water of the *Karst* regions west of the Adriatic. Assisted by the engineer, W. Putick, he was able to add much to the knowledge of the grottoes near Adelsberg (Carniola), and to prove that one branch of the Unz (the stream which waters the valley of Planina) is derived from the intermittent lake of Zirknitz. The other branch was traced for a long distance within the grotto of Adelsberg, which proves to be the longest in Europe. In Bosnia and Herzegovina the abundance of the water and the unwillingness of the inhabitants to penetrate far underground, stood in the way of thorough exploration, but enough was done to show (1) that, as in other limestone regions, to which these are exactly parallel, the springs are due to the rain absorbed or streams engulfed in the higher lands; (2) that the "natural wells" may quite well have been formed by the superficial erosion of a body of water; (3) that the temperature of the springs is often much below the mean of the place in which they occur, the water having been absorbed perhaps some thousands of feet higher. Much still remains to be done in the way of systematic exploration, the practical results of which will be important in the direction of better management of the water-supply, etc. In the same periodical (1894, p. 5) the recent exploration of the extensive, many-chambered grotto of Tharaux, in France, is described, with plan and sections. Here some bones of ruminants and a human thigh-bone of large size were discovered.

The Northern French Jura.—The April number of the *Annales de Géographie* contains a long paper on the Jura of northern Franche Comté by M. W. Kilian, professor of geology at Grenoble. The map which illustrates the article is accompanied by a superposed transparent sheet, showing all the synclinal and anticlinal foldings of the strata, and the numerous faults that occur. M. Kilian classifies the district in and around the department of Doubs into five natural regions. 1. The low-lying ground, which rises to from 900 to 1200 feet, between the Rhine and the Saône. The soil is alluvial, forming fertile field and bearing forests, but when it is very sandy it is less capable of cultivation. The population is mainly agricultural. 2. The hills bordering the Vosges with silicious soil, bearing its typical vegetation of broom, heather, purple foxglove, etc., in marked contrast to the rest of the district. Some famous millstones are quarried here, but most of the people find their livelihood in the forests. 3. The plateaux and hills of Haute Saône, with fertile marl lands to the north (meadows, fields, vines, etc.), limy plateaux partly wooded, partly cropped with cereals and potatoes, and the rest on the whole infertile. 4. The western edge of the Jura—the pre-jurassic hills and sub-Vosgian steeps, as Professor Kilian calls it—a series of undulating plateaux, averaging 1200 to 1600 feet high, between the Jura and the Ognon, where they end in abrupt cliffs. On the plain up to 1200 feet cereals predominate, but the vine also grows, and rich meadows cover the silicious soil. This soil on the higher ground, which rises to 2100 feet, is also fertile, and is in great contrast to the limestone parts, which are barren. Breeding is common everywhere, and the industries carried on in the valleys make Franche Comté one of the richest regions of France. 5. The Jura Mountains of the Department of Doubs. The middle mounts, a plateau averaging from 2000 to 2300 feet, with summits rising to 3000 feet, and the higher or true Jura mountains consisting of plateau from 3000 to 3300 feet, with peaks almost 4500 feet. The middle mounts are cultivated in the lower parts, and consist of forest and pasture lands in the upper parts; the mountains show a vivid contrast of sparkling green pasturage and sombre pine forests; the houses with overhanging roofs, and the melancholy cadence of the cow-bells, all help to constitute the charm of the French Juras. The people in the lower valleys are industrial, working forges, sawmills, distilleries, etc.; and clockmaking is a common industry on the plateaux. Agriculture and horse and cattle breeding are common on the lower grounds, but the upper valleys and plateaux are used for pasturage, the district being famous for the production of gruyère cheese. Crops are rare over 2500 feet; but absinthe is cultivated in the high valley of the Doubs, near Portarlier.

Geological Excursion in the Alps.—In connection with the Sixth International Geological Congress to be held at Zurich next autumn, a long excursion has been planned, under the guidance of Professors Brückner, Du Pasquier, and Penck, for the special study of the remains of the Great Ice Age. The excursion will start on September 17 at Lugano. On the first day the moraines of the Ice-Age glacier of Lago Maggiore will be studied, on the second the party will move on to Ivrea, on the third day to the Garda lake, on the fourth the Bremen Pass will be crossed, the Sillthal examined, and the fifth and last day will be occupied by an excursion to study the moraine features of the neighbourhood of Munich. A special guide-book for the tour is in preparation, and will soon be published. Those wishing to take part in the trip are requested to send their names to Professor Brückner in Bern.

The Rivers of Russia.—A large expedition is to be sent out this summer for the exploration of the rivers of European Russia. The first impulse having been given by the necessity of studying the causes which result in a continual increase of the shallowness of Russian rivers, the expedition has been planned, under the leadership of General Tillo and several geologists, in quite a scientific way. The sources of the rivers will be investigated first, and especially the plateau from which the Volga, the Düna, the Oka, the Don, and many of their tributaries take origin. Typical rivers and typical regions have been carefully chosen for this year's exploration. The Volga is taken as the type of a river originating in a plateau covered by marshes and lakes; the Krasivaya Mecha ("Pretty Mecha"), a tributary of the Don, is taken as a type of rivers originating also on a plateau, but from springs, and so on. The exploration will be geographical, geological, and economical—its leaders being General Tillo, M. Nikitin, professor of geology, a professor of forestry, M. Turskiy, an engineer, and an agriculturist.

ASIA.

Rewards to Tibetan Explorers.—The Indian Government have granted Rs. 1000, together with the title of Rai Bahadur and a medal, as a reward to the Lama Ugyen Gyatsho, the well-known Tibetan explorer, for his geographical exploits spread over a series of years. His first journey was made in 1879, at a time when he was serving under the director of public instruction for Bengal, by whom he was lent to the Survey Department for the expedition referred to. It was carried out in company with Sarat Chandra Das, and extended from Darjiling to Shigatze and back; but the full account, for some reason, was never published. A brief abstract will be found at p. 45 of the Survey Report for 1881–82, in which the Lama's name is not given, but only that of the Babu Sarat Chandra Das, though the former was the better linguist, and personally known in Tibet, while his companion was not. In 1881-82 the Lama explored a part of Western Tibet, including Jang Lhachi, Sakya Jang, and Lake Chomo Telthung, a journey to which reference is made at p. xlvii. in the appendix to the Annual Report for 1883-84. His most important exploration was in 1883-84, when his travels practically covered the whole of the north-east trans-frontier sheet No. 6 with a network of traverses, and also parts of the three sheets immediately to the west, south, and east. His data on this occasion supplied much original information about the true configuration of the famous Yamdok Tso or Palti lake, the Lhobrak river and its main affluents, which form the Manas river of Assam, and the Tigu Tso lake. The traverses also tied together a good deal of scattered data, acquired by Captain Pemberton in 1840 and by subsequent explorers. As to the accuracy of the Lama's work, Colonel Tanner reported of it in 1887 that it was of first-rate order. The traverses were computed and plotted on rectangular co-ordinates, after the manner of chain and theodolite traverse. Starting from the Chola Pass and closing on Chetang, the longitude of Lhasa agreed with Nain Singh's by less than a mile. The Lama made none of those long halts which have so often delayed the work of other explorers. He was thoroughly interested in the operations in which he was engaged, and in general the colonel considered that his work bore comparison with that of the best explorations in Tibet. Subsequently Lama Ugyen Gyatsho rendered some material help in the preparation of the manuscript narrative of a journey from Darjiling to Gyala Sindong, Tsari, and along the lower Sanpo, by another Tibetan, Kinthup, who had been sold into slavery, and kept a prisoner for nearly six years while conducting that exploration, and who has since received a gratuity of Rs. 3000 from Government. The Lama also assisted in drawing up an account of the Pama Koichen country, from the original manuscript of a Mongolian lama named Sarap Gyatsho. More recently Ugyen Gyatsho rendered invaluable service as chief interpreter, during the latter part of the Sikkim expedition, in obtaining information from prisoners, or in supplying useful details regarding the road from Jelep to Chumbi. As a result of his researches and inquiries, a revised map of Eastern Tibet was drawn up, which compares favourably with the route-map of M. Bonvalot.

The Pamirs.—The Russian *Official Messenger* publishes a letter from Sven Hedin, who has made, during his journey from New Marghilan to the Russian military post, Pamirski, very interesting scientific observations. He reached the post on March 18, after a very difficult journey, the most difficult part of it having been the passage through the Tenghiz-bai gorge. The northern slope of the pass was all covered with snow avalanches, which were forming large snow cones, round each of which a special footpath had to be made for the passage of the beasts of burden. Once, when this precaution had been neglected, a horse slid on the icy surface of a snow corniche, and fell down a precipice, 120 feet deep, into the river Isfairam, and of course was killed on the spot. Still the passage through the valley of the Isfairam was delightful, on account of the beauty of the views, which opened at every step of advance. From Austan to Langar the ascent is very steep, and the mass of snow increased, so that after a twelve hours' ascent the party was half broken down on reaching the Kirghiz yurts at Langar. On the southern side of the Tenghiz-bai Pass the snow was also very deep. On the day before, an enormous avalanche, over 400 yards long and over 20 yards deep, had fallen, and when the party reached Daraut-kurgan a snowstorm began. Snow was also very deep in the whole of the Alai valley. It appeared from a measurement that the Kizil-su at Daraut-kurgan carries 26·3 cubic yards of water per second (2,272,500 per day); but during the summer the same river carries four to five times more water than during the winter. At Bardob the traveller dug through the snow, and found it 1 yard (91 centimetres) deep; it consisted of six different layers, indicating six different periods of snowfall. The temperature of the air being 11·3° Fahr., the temperature of the snow at a depth of an inch was—8·5° Fahr., and it increased by 1·8° Fahr. for each 15¾ inches (one-tenth of a centigrade degree for each four centimetres). It may thus be taken that, on the Pamirs and the Alai, the soil freezes to a depth of 3·3 feet, where it is protected by the snow from the burning rays of the sun. Snow remained deep as far as Kizil-art, but on the southern side of this gorge it became scarce, and large spaces remained quite free. Taking advantage of the ice which covered Lake Kara-Kul, M. Hedin made measurements of its depth. As might have been expected from the surrounding mountains, which appear in high and huge masses on the western shore, while the eastern shore lies in flat valleys, the depth of the lake in its eastern part is small; but it is more considerable than might have been expected from a lake lying on a plateau, in its western part: there it attained 825 feet. The temperature on the surface was that of the freezing-point, but it increased where the depth was greatest. The thickness of the ice was such, the author remarks, that St. Petersburg might have been built on the western side of the lake, and Moscow on the eastern side. On Muz-Kol M. Hedin saw a very interesting formation of ice, deposited by two wells, which had assumed the form of two small volcanoes, 16 and 26 feet high, and about 660 feet in circumference, with a funnel in the middle, from which water was continuing to flow. The Ak-baital Pass was very difficult, and the party there lost a second horse. Altogether, the winter journey on the Pamirs is full of hardships, and it could not have been performed were it not for the extreme kindness of the Kirghiz and the Russian authorities. Favourable circumstances must also be taken into account. There was only one snowstorm, and the temperature was not unbearable. The observed minimum was—36·5° Fahr. on Kok-sai, and at Urtak it was —30° in the open air, and −12° in the tent. At Kara-Kul the party was met by a "jighit," despatched from the Pamirski post; and on March 18 they saw the most wonderful sight of a Russian post, with its earthen fortifications and quick-firing guns, amidst the wild plateau of the "Roof of the World." The fort, the traveller remarks, is very well built, and the difficulties which must have been overcome testify to the enterprise and energy of the builders.

The Amur Geographical Society.—A new branch of the Russian Geographical Society has been opened at Khaborovsk, the capital of the Amur region. The "Society for the Study of the Amur Region," which has been in existence for several years, and has issued a number of valuable publications, will form the nucleus of the new branch of the Russian Geographical Society, which will be named "the Amur Branch." Like the East-Siberian Branch, it will receive from the Government a yearly subsidy of 2000 roubles. It is already in possession of a good library, to which books have been contributed by members of the Imperial family, the President of the Siberian Railway Committee, and other high functionaries.

Cartography of Russian Turkistan.—During the year 1893, several important cartographical undertakings have been accomplished in Russian Turkistan. Surveys on the scale of 550 yards to the inch have been made in the provinces of Syr-daria and Fergana, in the neighbourhood of the Pamir military station, at Kala-i-khumb, and of the passages across the Amu. Surveys on the scale of 2 versts to the inch have been carried on on the Pamirs and along the Amu, so that a complete map of the whole of the navigable part of the Amu, as also of part of its upper course, is now ready. Surveys on a smaller scale (5 versts to the inch) have been made chiefly in Bokhara, where a detailed large scale plan of the capital has also been prepared. The cartographical department of the general staff has prepared the following maps: the roads of the Turkistan military district, on a scale of 40 versts (27 miles) to the inch; the Alai road (10 versts to the inch); the Russian settlements in Syr-daria; Southern Turkistan, with an indication of the lands which can be irrigated; and the fifth sheet of the seventh series of the great map of Russian Turkistan (10 versts to the inch). Reconnoitring surveys have been made in the mountains of Roshan; in Darvaz; of the roads from Tash-kurgan to Sarez; from Markan-su to Kashgar; from Kashgar, *viâ* Sari-kol, to Rang-kul; and from Guzar to Kerki; as well as in the delta of the Amu-daria.

Russian Tibet Expedition.—The following telegram has been received at St. Petersburg from the chief of the Tibet expedition, Captain Roborovsky. It was sent from the Sa-chu oasis, on March 14, through Kulja. "From Lukchun the expedition has passed by the southern desert road to Sa-chu. Kozloff has come here as well, through Kizil-sinir, so that our march-routes have girdled the desert. Three excursions have been made into the interior. The surveys made from Lukchun cover 2540 versts (over 1600 miles); nine astronomically determined points. Killed for our collections six wild camels. The other work of the expedition is also done regularly. Propose to make two more excursions into the mountains before leaving Sa-chu. Spring has come, grain is sown. The expedition all well and in good spirits. Friendly with the Chinese. Not met with engineer Obrucheff. More details by letter."

Plants from Tibet.—Mr. Hemsley has lately reported on the plants collected by Dr. Thorold during Captain Bower's recent expedition to Tibet, of which an account has appeared in the *Journal*. Not a tree nor a shrub was seen by the party during the five months they spent at an altitude of over 15,000 feet. 115 species of plants were brought home, one-quarter of them being peculiar to Tibet. The highest elevation at which a flowering plant (*Saussurea tridactyla*) was found was 19,000 feet; but the Schlagintweits discovered a plant living at a still greater elevation (20,000 feet), at a higher latitude. Red-coloured flowers formed a quarter of the whole, then yellow, white, and blue. Many of the plants were well protected by thick wool. Butterflies were seen as high as 17,000 feet.

Orthography of Shan Names.—We have received, though somewhat late in the day, a copy of the "Tables for the Transliteration of Shan Names into English," published by the Superintendent of Government Printing, Rangoon, 1892; price 2 annas. These tables give the English equivalents for sounds according to the Shan and Burmese dialects, and are accompanied by explanatory notes and a list of the principal Shan place-names in the vernacular, with the transliteration as directed by the new rules, and also giving the form of spelling hitherto in use and now considered obsolete. Though it is undoubtedly an advance to have any authorized rules issued on the subject, especially in connection with a language so difficult and little known as the Shan language, still it is to be regretted that, when introducing the system, it was not found possible to adopt, or at all events to more fully adapt, the rules for the orthography of native names, published by the R.G.S. and now so largely in use. The rules we are now reviewing express many sounds by means of diacritical signs, which we cannot help thinking might have been dispensed with for all practical purposes, especially if one acute accent were admitted, as in the R.G.S. rules, to show on what syllable the inflection should be put. In making a map of the Shan states these rules would be useful, but it would be necessary to retransliterate them into the rendering according to the R.G.S. rules in order to do away with the diacritical signs, which must be obnoxious to the mapmaker and to the general reader. We, however, congratulate those who have thus made a beginning, and an effort to secure some sort of system and uniformity, and only hope that eventually their system may be still further simplified.

AFRICA.

French Expeditions in the Sahara.—The two expeditions which have lately attempted to open a route from South Algeria to the Sudan, through the territory of the "Asjer" Tuareg and Air, have returned without accomplishing their main object, though they may be said to have paved the way for future success (*Revue Française*, May, 1894). M. Foureau, the leader of the first (*vide* vol. iii. p. 332), has already described his journey before the Paris Geographical Society. After his rapid excursion towards Insala, he took the road to the south-east, and crossing the Igharghar river-bed, reached the Asjer country by a route differing from that of Colonel Flatters in 1880, though in part coinciding with that of Duveyrier (1860). After long negotiations, he obtained permission to proceed southwards, and had reached the mountainous region of the *Tassili*, which forms part of the long line of high ground stretching from Tuat to Tibesti, when the opposition of a fanatical *sherif* compelled his return, this being the third year which he has spent in unsuccessful efforts for the opening of this route. Following in his steps only a few weeks later, the second expedition, led by M. d'Attanoux, was not likely to fare better. He succeeded, however, in allaying the suspicions of the Asjer, and obtained their recognition of the treaty of Ghadames of 1862, besides an assurance that they would use their influence with the Kel Wi further south for the opening of the route next year. Both travellers found considerable quantities of water in the *wadis*, and the temporary lake of Menghough, which formed the turning-point of the latter, was full at the time. The *Tassili* above mentioned consists of dark limestone, bristling with sharp peaks and fissured by *wadis* running north and south, which afford natural routes to the Sudan. M. d'Attanoux arrived at Biskra, *viâ* Tuggurt, on April 7, and was shortly to give an account of his journey in Paris.

Meteorology of German West Africa.—Systematic meteorological observations have for several years been carried out at some of the German stations in West Africa, and the results for recent years are published in the *Mitt. aus d. Deutschen Schutzgebieten* (1894, part i.). In the case of Bismarckburg, in the interior of the Togoland Protectorate, they extend from June, 1891, to May, 1893; but, according to an editorial note, have not been made with such care as in the preceding years, so that less interest attaches to the averages for the five for which observations are now available. It is especially to be regretted that the comparison of the temperatures given by Assmann's Aspiration Thermometer with those obtained in the ordinary way was not more complete, so that it might be seen how far the results usually obtained in a dry climate with few clouds are in excess of the truth. The observations, however, suffice to show that the difference is most pronounced during the dry months, which agrees with the fact that none is observed in a moist and cloudy district like the Cameroons. Judged by the mean of observations taken at 6 a.m., 2 p.m., and 9 p.m., the hottest months are February and March (in which the barometric pressure also is lowest), and the coldest July and August. The extreme range of temperature during five years was between 52·7° and 99·7° or 47° F. The principal rainfall is between April and October, with, however, a more or less marked break in August. Even in the dryest months there are from three to five days with rain, the minimum for a month being about one-tenth of the maximum. Between October and February east or north-east winds are the most frequent, and for the rest of the year those from the west, south-west, or south. A constant direction is not maintained for any length of time, for, except in the case of westerly winds in July, in no month did even a third of the observations show the same direction. At the Cameroons station the rainfall is, of course, much greater, as much as 40·2 inches falling in one month (July) in 1891 (an abnormal year, however). Here, too, a slight falling off in August is noticeable, as also in the third station to be referred to, but the dry months are fewer. While the average temperature of the hottest month is about the same as at Bismarckburg, the yearly range is less, the coldest month being higher. From the greater completeness of the observations at Baliburg (northern interior of the Cameroons) in 1892 than in 1891, the yearly variations are brought out better, and especially the fact that there is a principal maximum and minimum of temperature in April and July respectively, and subordinate ones in November and January. With lower actual temperatures, the extreme range was almost exactly the same as at Bismarckburg (47·3° F.). The amount of rainfall was intermediate between those at the other stations. In distribution through the year it agreed more with that at the Cameroons, there being only two months (December and January) with rain on fewer than 11 days. The preponderance of west and south-west winds is very marked, more than half the observations (excluding those during calm) showing one or other direction. This no doubt explains the greater accord in the observations with the Cameroons than with Bismarckburg, though in distance from the coast the station corresponds more with the latter.

Italian Explorations in the Basin of the Jub.—From an account of these explorations by G. E. Fritzsche, in *Pet. Mitt.*, 1894, No. 5, we learn that Prince Ruspoli, after replenishing his supplies at Bardera (*vide* vol. iii. p. 137), carried out his intended journey towards Lake Rudolf. From the Upper Dau, he is said to have crossed the watershed to the south of Lake Abba, and to have reached the Omo, on the right bank of which he proceeded as far as Gubaljenda, in the Gobo district. Here he was unfortunately killed by an elephant while hunting, but his collections and journals were brought back to the coast by his followers. It is not stated whether the question of the final destination of the Omo was cleared up. As, however, the district of Gobo, as given on our present maps, is considerably south of Borelli's furthest point, and only 70 miles from Lake Rudolf, there is hardly room for doubt that that river does empty itself into that lake. A map is given with the article above mentioned, in which the route of the Italian travellers, as laid down provisionally by the Italian Geographical Society, are adjusted to positions fixed by other travellers. Böttego's furthest point among the head-waters of the Jub is carried on the Italian map as far north as 7° 22½′ N. L., his Mount Fakeo being identified with the Mount Unkolo-Mutte seen by Traversi in 1887, and the Jub basin extended north of 8° by the inclusion of the Webi Sidama and other streams usually supposed to flow to the Webi Shebeyli.

AMERICA.

The Upper Ohio Basin in Pre-Glacial Times.—Messrs. Chamberlin and Leverett publish a long account of their recent studies in the drainage features of the Upper Ohio Basin, in the *American Journal of Science* for April (vol. 47, p. 247). The article is illustrated by several maps, showing the present drainage system, the moraine borders, older drift borders, and old outlets to Lake Erie, which form the base of a map of the probable drainage features in pre-glacial times. The authors conclude that then the Upper Allegheny turned northward from its present course at Steamburg, and reached Lake Erie by the Conewango Creek reversed and the Cattaraugus valley; and it was probably joined by the Upper Conewango-Tionesta system. Another system was that of the Old Middle Allegheny, which included the lower portion of the Tivesta, the Allegheny from Thompson's to Franklin, whence it flowed along French Creek and Sugar Creek, turning south-west and reaching French Creek again north of Utica, and thence to Lake Erie, East Sandy Creek flowed as it does now, and then followed the present Allegheny bed reversed to Franklin. The other left affluent of this Old Middle Allegheny River flowed from near the mouth of the Clarion River north-westwards along the present Allegheny valley, and along West Sandy Creek still in a north-west direction to Waterloo, where it turned northwards and joined the main river, where Sugar Creek *now* meets French Creek. The Lower Allegheny Monongahela and Upper Ohio are made into the basin drained into Lake Erie, as suggested by Dr. J. W. Spencer and Dr. P. Max Foshay, from whom the present authors differ only in making the probable watershed 50 miles further south on the Ohio. The Clarion, the Allegheny from Parker, the Monongahela, and all the affluents of these met at Pittsburg as at present, followed the Ohio bed to Beaver, received there a tributary, following the present Ohio course from beyond North Martinsville, and then flowed northwards along the Beaver valley to Sharon, bent south-west until the Mahoning valley was met, and flowed north-west along it until in a line with the Grand River, by which it passed to Lake Erie. They also publish a number of sections showing rock-floor, moraines, drift, glacial gravel, the old river-beds and the beds of the present streams. They assert that the phenomena described and mapped can be explained only by some hypothesis considering simple glacial and fluvial action, allowing for discontinuities—stages of deposition separated by stages of excavation. They give four such hypotheses, all of which agree in emphasizing the deposition that took place in the first glacial epoch, followed by a period of excavation, when gravel or gravel and rock were removed.

Types of Craters in Mexico and Guatemala.—Dr. Carl Sapper summarizes the observations he made on craters during his travels in Mexico and Guatemala in 1892 and 1893, in the April number of *Petermanns Mitteilungen*. The rapidity with which a newly formed crater is transformed, and the shape it ultimately takes, depend on the nature of the materials of which it is composed, and on the strength of the various weathering agents, wind, rain, frost, chemical decomposition, etc. When the cone is originally made up of ashes, it is very soon modified by the falling away of the loose material, so that the mouth of the crater is widened, and a rapid flattening and lowering of the summit takes place, the winds and eroding agencies having full play. Such craters are Monterico, or in the limiting case Tacana, where nothing is left but the rocky foundation of the mountain. Lapilli craters have much the same history, but spread over a longer period; for instance, the south great Atillan volcano. In mixed craters the walls are partly of stone and partly of looser material. These are very common. The rocky part still shows the original outlines of the crater with steep walls, the looser part is modified as in the case of the ash craters, but less rapidly, as the stone walls form a protection. This is well seen in the principal crater of Tajumulco, and was probably the condition in most craters now partially destroyed. The most stable form is the true rocky crater, whose walls change very little. In the upper part is a ring of débris of loose eruptive material, while another rubbish band is formed round the bottom of the crater wall, making the originally tubular crater kettle-shaped. Popocatapetl is an example, but not a perfect one, as some lapilli banks occur in it.

AUSTRALASIA.

The Horn Expedition to Central Australia.—The following information regarding the above expedition is taken from recent numbers of *The Colonies and India*. The arrangements for the fitting out and equipment of the scientific expedition which Mr. W. A. Horn, of Adelaide, has sent at his own expense to the MacDonnell Ranges, were completed with great care. Having obtained leave from their duties at the University of Adelaide, Professor Ralph Tate and Dr. E. C. Stirling took charge, the former of the palæontological and botanical researches of the expedition, and the latter of the ethnological department, acting also as medical officer. Professor W. B. Spencer, of the University of Melbourne, conducts the studies in biology. The names of the other gentlemen in the expedition, with their respective posts, are: Mr. Charles Winnecke, surveyor and explorer; Mr. Watt, of the Sydney Geological Survey Department, field geologist; and Mr. F. W. Bett, of Adelaide, and Mr. G. A. Keartland, of the *Age* staff, Melbourne, ornithologists and general collectors. There are also several camel-drivers. Mr. Horn has left with the expedition, and will have charge of the party while he is with them, and, with Professor Spencer, he will undertake the work of photographing. The expedition proceeded by rail to Oodnadatta, and thence started to follow the Finke river to its junction with the Palmer. The route will then most likely be to Petermann Creek, where fossils have already been found, and thence to Gill's Range, Glen Edith, and Glen Helen, to Hermansburg, the Lutheran Mission station at the head of the Finke. Thence to the Glen of Palms and on to the Alice, and then return to the railway terminus. It is expected that the expedition will spend about three months in the far interior.

Neu Mecklenburg.—Neu Mecklenburg, which used to be called New Ireland, is an island of the Bismarck Archipelago, now under German rule. There is only one harbour in the very south of the south-east volcanic part of the island, of which little is known. Count Pfeil communicates a full account of his visit to the low, narrow, central portion of the island, which is composed of sedimentary rocks, to *Petermanns Mitteilungen* for April, 1894. He managed to land on the south-west coast, and clambered up the steep limestone, cutting down the underwood to clear a path to the top of the ridge. Few streamlets and only one or two villages were passed on the way. At the summit the sea could be seen on both sides. The villages on the eastern side were very neat, but the people were shy. A stretch of bush-covered flat land, through which a considerable stream flowed, was crossed before reaching the shore, which is fringed by a reef a mile broad. The party followed the shore northwards, and stayed for some time in a village whose inhabitants were friendly, and then turned southwards, crossing back to the south-west coast by a more southerly route than that by which they had come. An attempt was made to explore the southern part of the island, but after crossing the ridge the natives picked a quarrel with the count's men, and he was forced to turn back, with two of his party killed. The upper slopes of the hills are usually enveloped in mist; the intensely green vegetation consists of a profusion of mosses and ferns, with some fine orchids. The whole island is well wooded. The natives cultivate the taro and yam, the women doing most of the work. The sago palm is another source of food. There are no cockatoos, parrots, nor cassowaries, but the yellowish Torres Straits pigeons with black-bordered wings are very plentiful. There are many beetles, but few butterflies. Thin, big-boned, long-tailed black pigs are the only domestic animals, and they are well looked after when young. The giant mussel Tridacna found on the coast is too powerful to be opened by force, so when the natives see a shell gaping they thrust in a stone or a large stick, to prevent its shutting—the stick usually being well "bitten." The original inhabitants have been driven to the north and south of the islands by invaders who settled in the centre. These people build neat houses and are very cleanly, but they have a marked odour. The men are usually naked. Their weapons are spears, of which they have two sorts—one of hardwood, the other with a hardwood point fixed into a bamboo handle—and axes, without which they never travel. They have no shields, but use two sorts of drums. The ornaments are primitive. A piece of bamboo stem, whose diameter gradually increased, is thrust through the cartilage of the nose; armlets are made by a ring being carefully knocked off Triton mussel shells, and polished Tridacna shells are also used. Some excellent wood-carving is found, especially on the posts of the "tambu" house, on dance masks, and on the commemorative sticks, whose significance is not quite understood, though it is supposed to be historical. The natives are cannibals; the women cook the human flesh, but are not allowed to partake of it beyond licking their fingers. The natives are great traders, sailing in their canoes, which are made of a hollowed tree with an outrigger, in the west, but of separate planks fixed together and calked, and without any outrigger, on the south and east. Their money consists of different-coloured mussel shells, red, black, and white; each kind is strung separately, and each has a definite value. A special sort made of white discs fastened end to end to two strings, and sometimes increased in value by having bristles on the discs, is used in pig-bartering. The marriage customs are unknown for the south, they are almost none in the north, and resemble those of the adjoining island in the centre. The dead are burned, or buried at sea, with a stone fastened to the feet, and a bush in the hand to keep the body upright, and to frighten away the fish they hope to catch from the corpse. They believe in a continuation of life, the souls of the dead going to a near island, and in an invisible god and his wife, the mother of all men, who communicate with them through the priests, and profoundly influence their lives.

POLAR REGIONS.

The Danish Polar Observations at Godthaab.—The first part of vol. i. of the observations made at Godthaab during the twelve months August, 1882, to August, 1883, has recently been published by the Danish Meteorological Institute, and forms an important addition to the international series of polar observations. Three papers are included in the part issued, and of these the two first deal strictly with observations actually made at Godthaab; they are concerned with the appearances of the aurora borealis and with the measurement of terrestrial magnetic forces. The observations of the aurora are discussed by M. Adam Paulsen, under whose direction they were made; and the results, while differing in some respects from those deduced by Carlheim-Gyllenskiöld from the observations made simultaneously at Spitzbergen, seem to agree in modifying some of the conclusions founded by Tromholt on Kleinschmidt's observations at Godthaab during the period 1865–80. M. Paulsen gives a specially emphatic denial to Tromholt's hypothesis that periodic changes take place in the position of the auroral zone. He agrees with Carlheim-Gyllenskiöld in rejecting Weyprecht's classification of auroral forms, referring all appearances observed to two distinct types, the zone or horizontal luminous sheet, and the various forms of arch or band, the latter including the so-called "draperies." The mean azimuth of the summits of the arches was S. 42° E. compared with S. 24° E. at Spitzbergen, and the "auroral anomaly" or angle between the azimuth and the magnetic meridian was 15° 30′, against 11° 27′ at Spitzbergen. It is to be regretted that M. Paulsen's observations do not give more explicit information as to the position of the boreal crown; further evidence of its coincidence with the magnetic zenith would have been extremely valuable. Numerous measurements of the height of the aurora were made by a method described by M. Paulsen in a paper read before the Royal Danish Academy in February, 1889, with results varying from 500 feet to 42 miles. The aurora was several times observed at elevations lower than the summits of neighbouring mountains or than the lower clouds—contrary to the experience of the Spitzbergen observers, who record only two or three cases of elevations less than those of the upper clouds. The diurnal maximum occurred at 9 p.m., agreeing with Spitzbergen; and the annual variation, absent at the latter station, gave a maximum at the winter solstice.

The Surface Temperature of the North Atlantic.—An appendix to the volume of 'Danish Polar Observations,' recently published, contains a series of charts showing the mean temperature of the surface of the sea along the main routes between Scotland, Iceland, and Greenland. The observations, derived from log-books of Danish ships, number nearly 95,000, and cover the period 1876–90. Separate charts are given for the six months April to September, and the isothermal lines are drawn from the temperatures computed for 1° squares. One of the most striking features of these charts is the manner in which they show the seasonal changes in the axis of minimum surface temperature running northwards from Scotland past the Faroe Islands. This inflection of the isothermals is well defined in the charts of mean surface temperature published by the Norwegian North-Atlantic Expedition, and the Danish charts agree in showing that it is most strongly marked during spring, almost disappearing in autumn; facts which seem to indicate that during the former season the south-easterly winds associated with the "Iceland depression" tend to deflect part of the drift current from the Gulf Stream in a north-westerly direction, dividing it into two main sections, and leaving an intermediate space to be occupied by colder water. The limits of the east Greenland current are defined with great sharpness, and it would appear that this stream sends a branch round the north-east and east coasts of Iceland, divided from the main body by the warm drift round the western extremity. In every case the minimum surface temperature off the coast of Iceland is found to the east and north-east; and the fact that during July and August the sea is on an average more than 1° Fahr. colder than the air accounts for the high relative frequency of fogs in those regions. The occurrence of this cold area can scarcely be explained by any assumption of up-welling water, and presents another example of the complex "interdigitation" arising when two surface currents meet each other end on.

GENERAL.

The late Dr. Rae.—A biography of the late Dr. John Rae, F.R.S., the Arctic traveller, being in course of preparation, we are requested to say that Mrs. Rae will be obliged by the loan of any correspondence or other documents likely to help her. Her address is—Mrs. John Rae, 10, Royal Terrace, Warrior Square, St. Leonard's-on-Sea.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1893–94.

Special General Meeting, May 21, 1894.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

THE Meeting was summoned by the Council by the following notice, which was sent to all Fellows in Great Britain:—

The Council give notice that a Special General Meeting will be held at 3 P.M., on Monday, May 21st next, in the Hall of the University of London, Burlington Gardens, W. (by permission of the Senate), Clements R. Markham, Esq., C.B., F.R.S., etc., President, in the Chair, to consider the following proposals by the Council as to the alterations in the Society's Rules dealing with Special General Meetings.

Regulations, Chapter V., Section 1, par. 3, to read as follows, the words in *italics* being the proposed addition:—

> "This Meeting shall have for its objects to elect the Council and Officers for the ensuing year; to receive the Annual Report of the Council; to hear the President's Address, and to present the Gold Medals and other Awards of the Society, *and no other business shall be transacted.*"

Chapter V., Section 2, par. 2, to read as follows, the words in *italics* indicating the proposed changes or additions:—

> "Any six Fellows may propose* to the Council, by letter addressed to the Secretaries, any new regulation, or the alteration or repeal of any existing regulation, *or any resolution respecting the affairs of the Society,* and if dissatisfied with the answer of the Council *may if supported by the written requisition of not less than forty Fellows,* require that the proposal* be referred to a Special General Meeting, which the Council shall convene for that purpose within *two months* (instead of one month) after receiving such requisition."

Same Section, par. 3, to read:—

> "A *month's* notice (instead of a week's) at least of the time when, and the object for which, every Special Meeting is to be holden, shall be sent to every Fellow residing in the United Kingdom. And no other business than that of which notice has been thus given shall be entered upon or discussed at such Meeting."

Same Section, par. 5:—

> "Not fewer than *One hundred* Fellows (instead of twenty-five) must be present to *pass any resolution at* (instead of to constitute) a Special General Meeting."

D. W. Freshfield,
H. Seebohm,
Hon. Secretaries.

These proposed alterations were unanimously adopted by the Meeting.

Special Evening Meeting, May 21, 1894.—Clements R. Markham, Esq., c.b., f.r.s., President, in the Chair.

Elections.—*F. T. Gervers; Captain Alfred H. Hill Gibbons* (*3rd Battalion East Yorkshire Regiment*); *Minor C. Keith; Professor Charles Lapworth, F.R.S.; Bertram de Quincey Quincey; William Frederick Teare; Major-General Robert J. Jocelyn Stewart.*

The Paper read was:—

"A Journey in the Hadramut." By J. Theodore Bent.

The Anniversary Meeting, May 28, 1894.—Clements R. Markham, Esq., c.b., f.r.s., President, in the Chair.

At the commencement of the proceedings the Honorary Secretary (Mr. Douglas W. Freshfield) read the rules which govern the business of the Meeting.

The President next appointed Mr. Hugh Leonard and Mr. W. M. Corner scrutineers for the ballot about to take place.

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* In the circular calling the meeting the words "suggest" and "suggestion" were substituted for "propose" and "proposal" respectively. But the Meeting agreed with the President that the original words should be restored.

ELECTIONS.—*Gerald Blunt, B.A.*; *Major-General J. T. Crease, C.B.* (*Royal Marine Artillery*); *Rear-Admiral R. P. Dennistoun*; *Henry Fincham*; *Frederick Wm. Alfred H. Gillett*; *Thomas Henry Gurrin*; *George Christopher Morant*; *Commander Francis Curran Mullan*; *Lord Seymour*; *Rev. Martin E. Smit*; *Dr. A. Donaldson Smith*; *Vice-Admiral Richard E. Tracey*; *Charles Cheers Wakefield*.

The Annual Report of the Council was then read.

REPORT OF THE COUNCIL.

The Council have the pleasure of submitting to the Fellows the following Report on the general and financial condition of the Society:—

Membership.—The number of Fellows elected during the year ending April 30, 1894, was 240, and three Honorary Corresponding Members. In the previous year, 1892–93, the total elections amounted to 318, and in 1891–92 the number was 193. Our losses have been, by death 86 (besides two Honorary Corresponding Members), by resignation 51, and by removal on account of arrears of subscription 75; making an increase for the year of 29 Fellows. In the year 1892–93 there was an increase of 166, in 1891–92 a decrease of 23. The total number of Fellows on the list (exclusive of Honorary Members) on May 1 was 3775.

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the Financial year ending December 31, 1893 (*i.e.* exclusive of balance in hand and sale of Stock), was 11,050*l.* 2*s.* 1*d.*, of which 7458*l.* 10*s.* consisted of entrance fees and subscriptions of Fellows. In the previous year, 1892, the total net income was 9299*l.* 18*s.* 7*d.*, and the amount of subscriptions, etc., 7007*l.*; in 1891 the two totals were 8322*l.* 16*s.* 8*d.* and 6067*l.* respectively.

The net expenditure for the past year (*i.e.* exclusive of balance in hand and purchase of Stock) was 11,584*l.* 2*s.* 3*d.* The net expenditure in 1892 was 9012*l.* 7*s.* 5½*d.*; in 1891, 8171*l.* 3*s.* 9*d.*

The Finance Committee of the Council have held, as usual, Meetings during the year, supervising the accounts of the Society. The Annual Audit was held on April 20 last, the Auditors being, on behalf of the Council, Sir Rawson W. Rawson and Major Leonard Darwin, and on behalf of the Fellows at large, E. O. Tudor, Esq., and J. Duncan Thomson, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following Report to the Council:—

Auditors' Report.—"The Auditors appointed to examine the Accounts of the Royal Geographical Society for the year ended December 31, 1893, have examined the Balance Sheet submitted to them, and having compared it with the Books and Vouchers, have found it correctly stated and sufficiently vouched.

"The Books have been kept and the Accounts rendered in the usual satisfactory manner.

"The Balance Sheet shows a large increase both of Receipts and Expenditure. The gross amount on both sides of the account is 12,738*l.*; the corresponding figure in 1892 was 9570*l.* But if balances and investments be excluded, the net receipts of last year exceeded those of 1892 by 1751*l.*, and the net expenditure exceeded that of 1892 by 2572*l.* The net expenditure of 1893 exceeded the net receipts by 533*l.*, which was covered by the balance in hand at the commencement of that year.

"The Auditors would call the attention of the Council to the large increase in the Expenditure of the Society in the last two years, but would at the same time point out that there has been a large, although scarcely corresponding, increase in the Receipts.

"Thus, the net Receipts and Expenditure of the last four years, exclusive of Balances and Investments, or sales of Stock, have been as follows:—

	Net Receipts. £	Net Expenditure. £	Difference. £
1890 ..	9532	8219	1313 +
1891 ..	8323	8171	152 +
1892 ..	9300	9012	288 +
1893 ..	11,051	11,584	533 −

"The receipts of the year 1890 were exceptionally increased by the unusual accession of Fellows and the Sale of Tickets for the Reception at the Albert Hall on the occasion of the return of Mr. H. M. Stanley; in like manner those of 1893 were exceptionally increased by the Earl of Derby's Legacy of 1000*l.*; by the facility newly offered to Fellows in connection with Life Compositions, of which 26 have availed themselves, and by the increase of the Entrance Fee from 3*l.* to 5*l.*, which increase was paid by 199 Fellows in 1893. In estimating the Revenue of the current and future years, the casual nature of the first two items must be kept in view.

"With regard to the expenditure of the year, it is satisfactory to note that the expenses of the permanent establishment, 4318*l.*, were somewhat less than in 1892. The large increase above noticed may be divided into six heads, none of which is necessarily of a recurrent nature, and all of which can be kept down, if desirable, to meet the limits of the annual income, viz.:—

	Increase. £
1. Monthly *Journal*—Printing, Maps, Contributors, Postage	1069
2. Supplementary Papers (Spent in 1892, 86*l.*)	571
3. Scientific Instruction—Cambridge Lectures, 300*l.*, and Educational Lectures	628
4. Preparation of Library Catalogue	120
5. Evening Meetings—Hand Maps and Refreshments	205
6. Admission of Ladies Controversy—Printing and Legal Expenses ..	282
	£2875

"The Auditors are informed that the increase under the first head arose mainly from the change in the form of the *Journal*, and was partly met by an increased sale and receipts for advertisements.

"The unpublished 'Supplementary Papers' had been accumulating for the last three years; one-half of the cost of Lectures was covered by fees for admission.

"It will be observed that Lord Derby's Legacy of 1000*l.* has been invested, and that to meet current expenses a nearly equal sum has been withdrawn from the invested funds of the Society. The amount of the total investments therefore remains about the same as at the last Audit, viz. 21,602*l.* 12*s.* 4*d.* The details are stated in the Balance Sheet.

"The present value of this Stock is estimated at 27,133*l.* 3*s.* 10*d.*

"The total Assets of the Society, estimated in 1892 at 48,185*l.* 14*s.* 7*d.*, may be estimated at present at 47,745*l.* 3*s.* 0½*d.*, the reduction being caused by the difference between the amounts of the balance at the commencement and close of the year.

"RAWSON W. RAWSON,
"LEONARD DARWIN,
"J. D. THOMSON,
"E. O. TUDOR,
} *Auditors.*

"*April* 20, 1894."

Receipts. **BALANCE SHEET FOR THE YEAR 1893.** *Expenditure.*

1893.	£	s.	d.	£	s.	d.
Balance in Bankers' hands, Dec. 31, 1892	546	19	2			
Do. Accountant's do.	11	3	2			
				558	2	4
Subscriptions:—						
Arrears	252	0	0			
For the current year ..	4036	0	0			
Paid in advance	766	0	0			
				5054	0	0
Entrance Fees	..		..	1304	0	0
Life Compositions	..		..	1100	10	0
Parliamentary Grant ..	..		..	500	0	0
Royal Premium	..		..	52	10	0
Rent of Shop	..		..	107	10	0
Publications:—						
Sale of Publications ..	623	14	0			
Advertisements	164	0	0			
				787	14	0
Payments for Scientific Instruction	..		..	60	5	0
Educational Lectures:—						
Sale of Tickets	..		..	134	18	0
Payments in error	..		..	65	8	9
Loan of Slides, &c.	..		..	6	6	6
Legacy from the late Earl of Derby	..		..	1000	0	0
Sale of 1150*l*. *Consols* ..	..		..	1129	16	6
Dividends:—						
North-Eastern Railway 4 per Cent. Debenture Stock .. .. 1000*l*.	38	19	2			
Great Indian Peninsula Railway 5 per Cent. Stock .. .. 4850*l*.	289	2	7			
Great Western Railway 4½ per Cent. Stock [Davis bequest] 1800*l*.	74	10	1			
London and North-Western Railway 4 per Cent. Stock [Murchison bequest] 1000*l*.	38	19	2			
Caledonian Railway 4 per Cent. Preference Stock .. .. 2000*l*.	77	17	10			
Norwegian 4 per Cent. Bonds .. .. 1000*l*.	38	18	4			
New Zealand 4 per Cent. Stock . 1000*l*.	38	16	8			
New South Wales 3½ per Cent. Stock [Gill Memorial] 1028*l*. 5*s*. 6*d*	35	0	4			
India Stock .. 1000*l*.	31	12	4			
India 3½ per Cent. Debentures . 1000*l*.	34	1	2			
Consols . 2519*l*. 2*s*. 2*d*.	98	3	6			
„ [Peek Fund] 1000*l*.	26	15	2			
„ [Back bequest] 561*l*. 0*s*. 8*d*.	15	0	4			
„ [Trevelyan bequest] 510*l*. 4*s*. 0*d*.	13	12	8			
Metropolitan 3½ Consols 1000*l*. [Derby Legacy]	25	10	6			
				876	19	10
				£12,738	0	11

1893.	£	s.	d.	£	s.	d.
House:—						
Taxes and Insurance ..	97	10	0			
Repairs and Furniture..	152	12	10			
Coals, Gas and Water ..	88	11	6			
Miscellaneous..	131	14	2			
				470	8	6
Office:—						
Salaries and Gratuity ..	1018	0	0			
Stationery and Printing	439	2	0			
Miscellaneous	241	1	0			
				1698	3	0
Library:—						
Salaries	330	0	0			
Purchase of Books ..	120	4	0			
Binding	61	2	0			
Preparing Library Catalogue	120	0	0			
Miscellaneous	79	18	0			
				711	4	0
Map-room:—						
Salaries	526	10	0			
Purchase of Maps, &c...	73	13	11			
Repairs to Instruments	16	11	6			
Miscellaneous	75	14	9			
				692	10	2
Map-Drawing Room:—						
Salaries	366	13	4			
Miscellaneous	10	14	11			
				377	8	3
Meetings:—						
Evening Meetings (includes Lantern Slides, Reporting, Refreshments, &c.	437	6	2			
Hand Maps	95	15	0			
Anniversary Dinner ..	45	7	0			
Admission of Ladies:						
Legal Expenses . 114 6 0						
Printing and Postage of Circulars, &c. 168 2 8	282	8	8			
Miscellaneous	59	3	8¼			
				920	0	6¼
Medals and other Awards	..		..	243	12	9
Scientific Purposes and Education:—						
Scientific Instruction ..	164	5	0			
Cambridge University (Geo. Lect., 2 yrs.)	300	0	0			
Oxford University ..	150	0	0			
Oxford University (Studentship)	50	0	0			
Owens College	50	0	0			
Educational Lectures ..	232	5	6			
Miscellaneous	55	0	0			
				1001	10	6
Publications:—						
Printing *Journal* (Jan. to Nov.)	1592	9	3			
Maps and Illustrations for *Journal* ..	1247	17	6			
Postage of *Journal* ..	401	19	5			
Payments to Contributors	300	0	0			
Printing 'Supplementary Papers' ..	497	18	3			
Maps for 'Supplementary Papers' ..	160	17	0			
Maps for *Proceedings* ..	87	4	7			
Payment to Chandra Das	100	0	0			
Editor of Publications ..	200	0	0			
Miscellaneous	132	12	6			
				4720	18	6
Payments in error returned	..		..	31	0	0
Expeditions and aid to Travellers:—						
Grant to Mr. Conway ..	300	0	0			
Grant to Asia Minor Exploration Fund ..	100	0	0			
Grant to Mr. Becher ..	100	0	0			
Instruments	217	6	0			
				717	6	0
Purchase of Stock:—						
Purchase of 1000*l*. Metropolitan 3½ (Derby Legacy) ..	..		..	1150	0	6
Balance in Bankers' hands, Dec. 31, 1893	163	0	6			
Do. Accountant's do.	9	10	8¼			
	172	11	2¼			
Deduct cheques not cashed	168	13	0			
				3	18	2¼
				£12,738	0	11

E. L. S. COCKS,
Treasurer.

Audited and found correct, April 20, 1894.

RAWSON W. RAWSON,
LEONARD DARWIN,
J. D. THOMSON,
E. O. TUDOR,
Auditors.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to December 31, 1892.

Year.	Cash Receipts within the Year.			Cash Amounts invested in Funds.			Deducting Amounts invested in Funds; actual Expenditure.		
	£	s.	d.	£	s.	d.	£	s.	d.
1848	696	10	5	..		..	755	6	1
1849	778	3	0	..		..	1098	7	6
1850	1036	10	5	..		..	877	2	10
1851	1056	11	8	..		..	906	14	7
1852	1220	3	4	..		..	996	13	1
1853	1917	2	6	..		..	1675	6	0
1854	2565	7	8	..		..	2197	19	3
1855	2584	7	0	..		..	2636	3	1
1856	[1] 3372	5	1	533	10	0	2814	8	1
1857	3142	13	4	378	0	0	3480	19	9
1858	3089	15	1	..		..	2944	13	6
1859	3471	11	8	950	0	0	3423	3	9
1860	[2] 6449	12	1	466	17	6	5406	3	7
1861	4792	12	9	1358	2	6	3074	7	4
1862	4659	7	9	1389	7	6	3095	19	4
1863	5256	9	3	1837	10	0	3655	4	0
1864	4977	8	6	1796	5	0	3647	7	10
1865	4905	8	3	1041	5	0	4307	4	5
1866	5085	8	3	1028	15	0	4052	15	0
1867	5462	7	11	1029	0	6	3943	17	4
1868	5991	4	0	1857	3	9	4156	17	10
1869	[3] 6859	16	0	2131	5	0	4646	0	8
1870	[4] 8042	6	1	3802	6	0	3845	10	6
1871	[5] 6637	3	7	1000	0	0	3726	4	4
1872	[6] 8119	7	9	1999	4	6	5871	13	2
1873	[7] 7761	18	10	2015	1	8	6697	12	6
1874	[8] 8753	5	10	499	0	0	7876	2	3
1875	7934	15	10	2002	7	6	5683	4	10
1876	[9] 11611	11	8	..		..	6870	13	1
1877	[10] 7950	1	11	2538	2	0	8940	17	11*
1878	[11] 8124	10	0	3000	0	0	6361	9	6
1879	[12] 8979	14	10	1551	10	10	6990	14	2
1880	8599	18	4	1567	5	1	8454	1	10†
1881	8809	19	5	..		..	8362	5	6‡
1882	[13] 8942	15	0	..		..	8779	10	7
1883	[14] 9599	9	0	1001	5	0	8624	2	11
1884	[15] 8964	11	7½	..		..	9266	0	5
1885	[16] 8738	12	3	..		..	8555	3	10½
1886	[17] 7968	9	0	1000	0	0	7767	18	0½
1887	8007	16	3	..		..	8493	10	3
1888	8053	5	0	..		..	7908	18	6
1889	8224	7	7	1000	0	0	7025	15	10
				On deposit.					
1890	9531	16	2	820	0	0	8218	5	10
1891	8322	16	8	1000	0	0	8171	3	9
1892	9299	18	7	..		..	9012	7	5½
1893	[18] 11050	2	1	1150	0	6	11584	2	3

[1] Includes Treasury Grant of 1000*l*. for the East African Expedition.

[2] Includes Treasury Grant of 2500*l*. for the East African Expedition.

[3] Includes Legacy of Mr. Benjamin Oliveira, 1506*l*. 17*s*. 1*d*.

[4] Includes Legacy of Mr. Alfred Davis, 1800*l*.

[5] Includes Legacy of Sir Roderick Murchison, 1000*l*.

[6] Includes Mr. James Young's Grant for Congo Expedition, 2000*l*.

[7] Includes 1009*l*. 14*s*. 6*d*., sale of Exchequer Bills.

[8] Includes Mr. James Young's Grant for the Congo Expedition, 1041*l*. 14*s*.

[9] Includes Parliamentary Grant of 3000*l*. to Cameron Expedition.

[10] Includes Donation of 500*l*. by Mr. C. J. Lambert.

[11] Includes Legacy of Admiral Sir George Back, 540*l*.

[12] Includes Legacy of Sir W. C. Trevelyan, 500*l*.

[13] Includes 1005*l*. 8*s*. 2*d*., sale of Exchequer Bills.

[14] Includes 1000*l*. received from Mr. B. Leigh Smith.

[15] Includes 500*l*. on loan from Bankers.

[16] Includes 998*l*. 0*s*. 10*d*., sale of India Debentures.

[17] Includes Donation of 1000*l*. from Miss Gill.

[18] Includes Legacy of the Earl of Derby, 1000*l*.

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* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

† This amount includes the payment of two sums of 500*l*. each, contributed to the African Exploration Fund in this and the previous year.

‡ This sum includes the payment of 102*l*. 8*s*. to the African Exploration Fund; also 714*l*. 9*s*. 1*d*., the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS.—December 31, 1893.

				£	s.	d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library insured for 10,000*l*.)				20,000	0	0
Investments (amount of Stock), as detailed in the above Report of the Auditors, valued March last at				27,133	4	10
Arrears due on December 31, 1893, £1521. Estimated at				608	0	0
Balance at Bank	£163	0	6			
„ in Accountant's hands..	9	10	8½			
	172	11	2½			
Deduct Cheques not cashed	168	13	0			
				3	18	2½
Total				£47,745	3	0½

ESTIMATE FOR THE YEAR 1894.

RECEIPTS.	£	s.	d.
Subscriptions	5060	0	0
Entrance Fees	900	0	0
Life Compositions	1000	0	0
Parliamentary Grant	500	0	0
Royal Premium	52	10	0
Rent of Shop	80	0	0
Publications	1100	0	0
Payments for Scientific Instruction	45	0	0
Payments made in error	65	0	0
Loan of Diagrams and Slides	9	0	0
Educational Lectures	50	0	0
Sale of *Proceedings* (Old Series)	100	0	0
Dividends	880	0	0
Total	£9841	10	0

EXPENDITURE.	£	s.	d.
House	416	18	0
Office	1642	0	0
Library	790	0	0
Printing Catalogue	335	0	0
Map Room	681	10	0
Map-Drawing Room	260	0	0
Meetings	324	2	0
Medals and other Awards	245	0	0
Scientific Purposes	640	0	0
Publications:			
Journal	3100	0	0
'Supplementary Papers'	262	0	0
Mr. Rockhill (editing Chandra Das's Reports)	150	0	0
Mr. Conway's Map	100	0	0
'Hints to Travellers': Printing, Maps, and Contributors	420	0	0
Expeditions	100	0	0
Payments in error returned	40	0	0
Balance available for contingencies	335	0	0
Total	£9841	10	0

Publications.—The monthly *Journal* has been issued with regularity throughout the year; the twelve numbers for 1893 forming two volumes of 1222 pages, illustrated by 49 maps and 31 illustrations. The total cost of the edition of 5500 copies (including 441*l.* 16*s.* 11*d.* for free delivery to Fellows and Institutions) was 4035*l.* 9*s.* 10*d.* From this is to be deducted the amount of 787*l.* 14*s.* received from sale of copies to the public and from advertisements. The sum of 658*l.* 15*s.* 3*d.* was expended on 'Supplementary Papers.'

The publication of a series of Extra Volumes was begun during the year, the first of the series being Mr. Beardoe Grundy's 'Topography of the Battlefield of Platæa.' These Extra Volumes will consist of memoirs and narratives that could not conveniently be included in the *Journal* or issued as gratis 'Supplementary Papers,' and will be procurable by Fellows at lower rates than by the general public.

Library.—During the past year 566 books and pamphlets, in addition to serial publications, have been added to the Library—439 by donation and 127 by purchase; 333 pamphlets have been put in covers by the Society's map-mounter, and 170 volumes have been bound. The sum of 142*l.* 19*s.* 5*d.* has been spent in purchasing books, and the further sum of 74*l.* 4*s.* in binding for the Library.

Library Catalogues.—It was decided, instead of issuing a third supplement to the Authors' Catalogue, to recast the whole work, and procure a new Catalogue in one volume, brought down to the close of 1893. The larger part of this Catalogue is in type, and the whole will soon be ready. Work has been carried forward steadily on the Subject Catalogue, which is complete for all accessions to the Library since January, 1892, and for all titles entered in the old Authors' Catalogue. The indexing for this Catalogue of periodicals earlier in date than 1892 has proved more arduous than was anticipated, but the great utility of the work justifies the time expended on it.

Scientific Purposes Grant.—During the past year 32 intending travellers have received instruction from Mr. Coles, in Practical Astronomy, in the Society's Observatory, and in route surveying with the theodolite, prismatic compass, and plane-table, in the country, and 479 hours have been devoted to teaching.

Instruments to the value of 605*l.* 13*s.* 6*d.* have been lent during the past year to the following travellers:—Rev. Walter Weston (Japan), 10*l.* 10*s.*; Mr. H. M. Becher (Malay Peninsula), 74*l.*; Dr. H. R. Mill (English Lakes), 12*l.* 13*s.*; Mr. W. H. Cozens-Hardy (Montenegro), 91*l.* 15*s.* 6*d.*; Mr. A. Trevor-Battye (Arctic Regions), 6*l.* 14*s.*; Mr. John Revilliod (South America), 59*l.* 4*s.*; Mr. G. F. Scott Elliott (Central Africa), 26*l.* 14*s.*; Captain Webster (New Guinea), 61*l.* 17*s.* 6*d.*; Mr. D. G. Hogarth (Asia Minor), 5*l.* 15*s.*; Major Hon. M. G. Talbot, R.E. (Upper Egypt), 37*l.*; Rev. C. H. Robinson (Sahara), 4*l.* 17*s.* 6*d.*; Mr. G. B. Grundy (Italy), 7*l.* 16*s.*; Mrs. Bishop (Korea), 5*l.* 6*s.* 6*d.*; Mr. H. H. Johnson (Nyasaland), 90*l.* 7*s.*; Lieut. F. W. Green, R.A. (Asia Minor), 4*l.* 10*s.*; Mr. R. T. Coryndon (Mashonaland), 32*l.* 13*s.* 6*d.*

The instruments lent to the following gentlemen have been returned during the past year, with the exception of those which have been lost:—Mr. G. B. Grundy (Bœotia), 1892; Captain H. W. Dowding, R.N. (Upper Amazons), 1893; Captain H. Picot, I.S.C. (Central Asia), 1893; Dr. H. R. Mill (English Lakes), 1893; Mr. W. H. Cozens-Hardy (Montenegro), 1893; Mr. St. G. R. Littledale (Central Asia), 1893; Mr. H. M. Becher (Malay Peninsula), 1893; Mr. John Revilliod (South America), 1893; Major Hon. M. G. Talbot, R.E. (Upper Egypt), 1894.

The following is a list of travellers who still have instruments lent to them in their possession:—Mr. W. Deans Cowan (Madagascar), 1883; Mr. A. R. Colquhoun (Burma), 1883; Mr. E. Douglas Archibald (for cloud observations in England), 1885; Mr. T. Bevan (New Guinea), 1887; Mr. H. H. Johnston (Nyasaland, Central Africa), 1889–91 and 1894; Rev. A. Hetherwick (South-East Africa), 1891; Dr. D. Kerr Cross (South-East Africa), 1891; Sir C. M. Macdonald (Niger Region), 1891; Mr. C. W. Campbell (Korea), 1893; Lieut. Coningham (Persia), 1893; Sir William Macgregor (New Guinea), 1893; Mr. J. C. White (Sikkim), 1893; Mr. R. M. W. Swan (South-East Africa), 1893; Rev. Walter Weston (Japan), 1893; Mr. A. Trevor-Battye (Arctic Regions), 1893; Mr. G. F. Scott Elliott (Central Africa), 1893; Captain Webster (New Guinea), 1893; Mr. D. G. Hogarth (Asia Minor), 1893; Rev. C. H. Robinson (Sahara), 1893; Mr. G. B. Grundy (Italy), 1893; Mrs. Bishop (Korea), 1894; Lieut. F. W. Green, R.A. (Asia Minor), 1894; Mr. R. T. Coryndon (Mashonaland), 1894.

Map Room.—The accessions to the Map Room Collection during the past year comprise 745 Maps and Charts on 1197 sheets; 48 Atlases (including continuations) containing 696 sheets of Maps, 1463 Photographs, 46 Illustrations, and 406 Lantern Slides. Of these, 90 Maps on 290 sheets, 14 Atlases, 905 Photographs, and 401 Lantern Slides have been purchased.

The adoption of the Report was moved by Major-General GOODENOUGH, and seconded by Sir JOHN SWINBURNE, Bart.

PRESENTATION OF THE ROYAL MEDALS AND OTHER AWARDS.

The Royal Medals and other Awards for the Encouragement of Geographical Science and Discovery were then presented by the PRESIDENT.

The Founders' Medal had been awarded to Captain H. BOWER for his journey across Tibet from east to west in 1891–2. In handing the medal to General Mylne for transmission to Captain Bower, the PRESIDENT said:—The Founder's Medal has been adjudicated to Captain Bower for the remarkable journey he made through Tibet from east to west, during which he traversed an immense extent of unknown country upwards of 1000 miles, and in the survey work over the parts which had been traversed before, he rectified the maps in many instances. I regret that Colonel Bower is not able to be present to receive the medal for his nephew, who is in India, but another relative, General Mylne, has come to do so. This adjudication of the highest honour we can confer will, I feel sure, convince Captain Bower that his splendid exploring work has been fully and cordially appreciated at home, and I believe also it will incite him to further efforts to achieve still more valuable and important work for geography in the time to come. I have great pleasure in reminding you that there is a very peculiar circumstance connected with the journey of Captain Bower—that is, that he is the very first officer since the time of Warren Hastings who has received official permission to travel in Tibet. In a recent letter I have received from the Marquis of Lansdowne, late Viceroy of India, who gave that permission, and who was Captain Bower's superior at that time, there is a passage which I think it well to read:—"Your reference to Bower's exploration is very satisfactory to me; it was a fine performance, and very creditable to the young officer who accomplished it." I believe that from one point of view Captain Bower will be as gratified with this recognition of his valuable work from his official superior, as from another point of view he will appreciate the honour the Royal Geographical Society has conferred upon him. I now present to you the Founders' Medal, and request you will have the kindness to transmit it to your relative.

The Patron's Medal had been awarded to M. ELISÉE RECLUS on the completion of his great work, 'La Nouvelle Géographie Universelle.' In handing it to Mr. Douglas Freshfield, M. Reclus's proposer, the PRESIDENT said:—The Patron's Gold Medal has been conferred upon the eminent French geographer, M. Reclus. I regret that through illness M. Reclus is unable to be present, and also that his Excellency the French Ambassador cannot attend this afternoon, to receive the award which has been adjudicated to his accomplished and, I may say, illustrious fellow-countryman. France is the country where scientific and critical geography first found a home some two centuries ago, and its men of science have well sustained the tradition of their predecessors during the intervening period. Geographers, at all events, have always in their rivalry felt that it was a friendly rivalry. Our ancestors admired the work of D'Anville, and we showed our appreciation of it when, shortly after his death, the greatest of English geographers arose, in the person of Major Rennell, and we gave him the name of the English D'Anville. Well, we have always taken that view with regard to France. We have admired the gifts of the people of that great country across the Channel, admired their talents, and emulated and tried to excel them in the field. As geographers, we have thought and spoken of France in the same way that Sir Philip Sidney, in one of his sonnets, wrote o her, as "that sweet enemy France"—a peculiarly happy phrase, because it implies both a friendship and a rivalry. The mantles of Sanson, Delisle, and D'Anville have now fallen on the shoulders of Reclus. It was a gigantic task he set before himself when he undertook the great work now completed—a work which involved years and years of study, and visits to many countries for geographical investigation; and I feel sure that the Society will join with me in congratulating him on the completion of a work that has occupied him incessantly for twenty years. Mr. Douglas Freshfield has kindly undertaken to receive the Patron's Medal, and to transmit it to the French geographer.

On receiving the Medal, Mr. D. Freshfield spoke as follows:—M. Reclus charges me to communicate through you, sir, to the Society his very deep appreciation of the honour done to him by the award of one of our Gold Medals. I have also to express his sincere sorrow that he has been prevented, by the state of his health and doctor's order, from crossing the Channel in order to be present here to-day. Further, we cannot but express regret that the unfortunate inability of his Excellency the French Ambassador to be with us this afternoon, deprives us of the pleasure of expressing through him to the French nation the satisfaction it has been to the Council to endorse the judgment expressed last year by the French Geographical Society in conferring their highest award on M. Reclus. In this double default it falls upon me, as the member of Council responsible for formally introducing M. Reclus's claims to the notice of my colleagues, to receive the medal on his behalf. M. Reclus, I am sure, would not desire me, speaking as I am to-day as his representative, to dwell at length on his personal services to geography. They have been briefly, but not inadequately, summarized by the President. I will rather, with your permission, occupy a few minutes in calling attention to those special qualities in French travellers and geographers which we recognize to-day. A traveller, like Julius Cæsar, must not only arrive; he must see, and grasp what he sees, so as to be able to communicate it to others—at least, if he cannot do this, he is hardly a geographer in the primitive and true sense of the word. We English boast that we are the greatest travellers in the world, but are we the best geographers? Germany runs us hard. And the French genius, we must admit, brings its own special and characteristic contributions to geographical science. It links it with literature and with art. What descriptions of strange scenes can surpass in vividness those of the Sahara we owe to Fromentin, or those of the deltas of Tonkin and the wilds of Morocco given us by Pierre Loti? Nor are our neighbours less successful in linking art and geography. Thanks partly to the liberality of their Government, partly to the resources of their great publishing houses and the intelligence of their craftsmen, they produce works illustrated in a manner we in London are only beginning to rival. But literary style and artistic embellishment are, after all, mere surface ornaments in the opinion of many—of all Philistia. The French bring to our science other qualities which go to the very root of the matter. One of the dangers that beset the geographical student is that of losing his own way and bewildering his followers among interminable details. In every work published in France, from a child's school-book to the 20 volumes of M. Reclus's encyclopædia, we find that lucid method, that order, that art of *étalage*, that swiftness in seizing characteristic points and generalizing from them, that marks the Gallic genius. It is now thirty-five years since M. Reclus, as he tells us in a passage which was, perhaps, inspired by an English historian, sitting on a grassy mound above the shallows of the Shannon, planned and pencilled down on the spot the first outlines of the great work he has now brought to a happy conclusion. 'La Terre et les Hommes' is its second title. To give a faithful picture of the earth as the home of humanity was its idea. To that purpose he has remained true through the working years of a lifetime. He has travelled himself in many parts of the world, including South America. He has drawn round him a staff of competent helpers. He has never missed a single date in a fortnightly publication. The result is a splendid monument of perseverance and of intelligence. Perfect M. Reclus would not pretend it to be. National genius as well as individual has the defects of its qualities, and M. Reclus is "French of the French." Politicians, as Praed long ago told us, are apt to be "just Eton boys grown heavy;" and England and France, like Eton and Harrow, are too close neighbours not to be also rivals. But I am only repeating the concluding words of M. Reclus's last volume when I record the expression of his trust that his labours may serve to bring forward the day when our descendants will have learnt to lay aside their jealousies, and to make the best not only of their planet but of one another.

The PRESIDENT, in handing the Murchison Grant to Captain Wiggins, said:—Captain Wiggins, the Murchison Grant has been awarded to you. I have felt for a very long time now that your great services to geography demanded some recognition from this Society. It is only five years since I had the great pleasure of making your personal acquaintance, but I have been very familiar with all you have done for upwards of twenty years, before you sailed in the *Diana* in 1874, and I rejoiced when you broke the spell and passed through those straits which had stopped all the earlier navigators, and made your way to the Yenisei. It was through your resolution, determination, and excellent seamanlike qualities that a new route has been opened for commerce in that part of the world. You are the pilot of the Kara Sea, and I understand that you have received a recognition of your services from His Imperial Majesty the Emperor of Russia; I am sure no man deserved it better. I cannot help also congratulating you on having had such a shipmate as Miss Peel, whose charming book has been published, containing an admirable account of the voyage. The Murchison Grant is in a peculiar way fitted for the recognition of your services, for Sir Roderick took the deepest interest in ice navigation, as well as in the commercial prosperity of Siberia and Russia. I have great pleasure in presenting you with the Murchison award in the form I believe you wish it should take.

In presenting the Cuthbert Peek Grant to Dr. J. W. GREGORY, the PRESIDENT said:—The Cuthbert Peek Grant has been adjudicated to Dr. Gregory. We all admired the resolution with which Dr. Gregory determined to do some good geographical work when the Villiers Expedition broke down, and the way in which he organized a small expedition when he was thrown on his own resources. I think that many men in your predicament would have given the matter up, but you resolutely went forward and did most admirable geographical work in the Mount Kenia region and towards Lake Baringo. The Council was particularly impressed with the importance of scientific attainments in a traveller in considering the results of your work, and I think they were influenced a great deal by their desire to give effect to that feeling when they decided upon adjudicating to you the Cuthbert Peek Grant. I now have great pleasure in presenting you with the diploma, and I believe that the grant itself has taken the form you wished it to take, and is ready for you.

The Gill Memorial, the PRESIDENT stated, is awarded to Mr. FERGUSON, who, having first qualified himself as a traveller, has made valuable observations and route surveys and has constructed excellent maps, both when employed on the commission of the German boundary and afterwards on several other occasions, especially throwing great light on the geography of the interior of the Gold Coast. I have great pleasure in presenting Mr. Ferguson's award to Colonel Dalton, if he will be so kind as to take it for him.

The PRESIDENT then said:—Captain SNOW has been selected for the Back Grant for two years, which we have it in our power to confer this year, for most valuable work in surveying and adding to the correctness of the maps of the Kurile Islands. I regret that he is not present to receive it himself.

The PRESIDENT then presented the prizes which had been gained by the Training College Students.

MALE STUDENTS—*Prizes*—(£5 each):—W. B. Alexander, Peterborough Training College; H. Copping, York Training College; E. Lupton, Culham Training College. *Book Prizes*:—C. Gould, Battersea Training College; H. Milnes, Borough Road Training College; W. Pope, Chelsea Training College; A. Purkington, Homerton Training College. FEMALE STUDENTS—*Prizes*—(£5 each):—A. M. Barnes, Tottenham Training College; D. Capamagian, Stockwell Training College; M. M. Lee, Derby Training College. *Book Prizes*:—J. G. Beckett, Stockwell Training College; E. H. Bowyer, Stockwell Training College; A. J. Stone, Tottenham Training College; A. E. Thompson, Tottenham Training College.*

Mr. J. R. LANGLER then made some remarks, pointing out the beneficial results which the awards of these prizes has had, and the more beneficial results likely to follow from the change to be introduced in the future.

THE BALLOT FOR THE COUNCIL, 1894–95.

The PRESIDENT then announced that, according to the report of the scrutineers, the list as proposed by the Council had been duly elected.

The list is as follows, the names of new members, or those who change office, being printed in *italics*:—

President:—Clements R. Markham, Esq., C.B., F.R.S., F.S.A. *Vice-Presidents*: W. T. Blanford, Esq., LL.D., F.R.S., F.G.S.; Hon. G. C. Brodrick; *Hon. George N. Curzon*, M.P.; Sir Joseph Hooker, K.C.S.I., C.B., F.R.S.; General R. Strachey, R.E., C.S.I., F.R.S.; Captain W. J. L. Wharton, R.N., F.R.S. *Treasurer*: Edward L. Somers Cocks, Esq. *Trustees*: Right Hon. Lord Aberdare, G.C.B., F.R.S.; Right Hon. Sir John Lubbock, Bart., F.R.S., M.P. *Secretaries*: H. Seebohm, Esq., F.L.S.; *Major Leonard Darwin*, R.E., M.P. *Foreign Secretary*: *Sir John Kirk*, K.C.B., G.C.M.G., F.R.S. *Councillors*: Vice-Admiral Lindesay Brine; *Robert Brown*, M.A., PH.D., F.L.S.; Lieut.-Colonel James Cecil Dalton, R.A.; *Right Hon. Hugh C. E. Childers*, F.R.S.; *Lieut.-General W. H. Goodenough*, R.A., C.B.; Sir George D. Taubman Goldie, K.C.M.G.; Major-General Sir F. J. Goldsmid, K.C.S.I., C.B.; General Sir T. E. Gordon, K.C.S.I., C.B.; Wilfred Hudleston, Esq., F.R.S., F.G.S.; *Lord Lamington*; J. K. Laughton, Esq.; George Sutherland Mackenzie, Esq.; *Rear-Admiral Albert Hastings Markham*; John Murray, Esq.; Ernest G. Ravenstein, Esq.; Sir Rawson W. Rawson, K.C.M.G., C.B.; Howard Saunders, Esq., F.L.S., F.Z.S.; Colonel H. C. B. Tanner; *Rear-Admiral E. Hobart Seymour*, C.B.; Lieut.-Colonel C. M. Watson, R.E., C.M.G.; *Lieut.-Colonel J. K. Trotter*, R.A.

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* The Medals, for the promotion of geographical education, placed by the Society at the disposal of the syndicates respectively of the Oxford and Cambridge Local Examinations, were awarded as follows:—

1893. Oxford (June).—*Silver Medal*—F. Cheeseright. *Silver Medal*—W. H. Wynn. *Silver Medal*—R. W. Davies. *Bronze Medal*—J. Duncan.

Cambridge (December).—*Silver Medal*—(Physical Geography)—Maud M. G. E. Gillitlie. *Silver Medal*—(Physical Geography)—Leonard Blackler. *Silver Medal* (Political Geography)—Oliver G. Anderson. *Silver Medal*—(Political Geography)—John William Dodd.

The Prize Atlases offered by the Society for geographical proficiency to the cadets of the Nautical Training Colleges, on board H.M. ships, *Worcester* and *Conway*, were awarded, at the examination held in July, 1893, to the following:—Herbert Raymond Bateman (*Conway* training ship); James Graham Parry (*Worcester* training ship).

The PRESIDENT then proceeded to deliver his Anniversary Address, after which Sir Rawson W. Rawson spoke as follows:—I rise with very great pleasure to propose a hearty vote of thanks to our President for his most interesting address. There is an old English proverb that good wine needs no bush, and I need not say much to excite your enthusiasm on the present occasion, and to induce you to join with me in a very cordial vote of thanks to our President. I think that you will be prepared to accept the change that he proposes to make in the form of the address to be annually offered to the members. I can carry back my memory to the time when Mr. Hamilton first introduced the plan of taking up a subject to interest the Fellows at their annual meeting. I can carry back my memory to the time when the Society met in a small room in Regent Street, just below Jermyn Street, with perhaps thirty or forty members present, when there were not more than 300 Fellows in the Society, and we sat upon school-benches; when our income, instead of being, as we hear to-day, upwards of 10,000*l.*, was about 1200*l.* We may congratulate ourselves upon the great progress the Society has made during these fifty years. What our President has told us to-day has not only satisfied us that geographical science is progressing, but that this Society is progressing with equal pace in assisting and directing that progress, and, as we have seen to-day, rewarding those who have been the active agents in advancing it. I have no doubt that under the presidency of Mr. Markham—upon whose appointment I think the Society may heartily congratulate itself, for I believe that if the mantle of Sir Roderick Murchison was transmitted to Sir Henry Rawlinson, he has passed it on to one of the most capable men to fill the post—the Society will progress greatly. You have seen to-day how capable he is from experience, from acquired knowledge, from his great zeal for the science to fill the post of President. I shall be very much disappointed if, under his guidance, the progress of the Society is not as rapid as it ever has been, and if its work is not even more solid and more useful to the country and to science generally. I have great pleasure in proposing a vote of thanks to Mr. Markham.

Admiral BRINE: I have very great pleasure in seconding that vote of thanks.

The PRESIDENT: I feel I do not in the least deserve all the very kind things said of me. I can assure the Society that so long as I am President it will be my earnest endeavour to promote the welfare of the Society in every possible way. I will say no more now, because I hope to meet you all this evening.

ANNIVERSARY DINNER.

The anniversary dinner was held on the evening of the anniversary meeting, May 28, in the Whitehall Rooms, Mr. Clements R. Markham, C.B., F.R.S., President, in the chair. Among those present were the Portuguese Minister, Sir F. Abel, Lord Aberdare, Admiral Lord Alcester, Lord Belhaven and Stenton, Mr. G. E. Buckle, Colonel G. E. Church, Mr. Edward Clodd, Hon. G. Curzon, Colonel J. C. Dalton, Major L. Darwin, Lord Egerton of Tatton, Sir J. W. Ellis, Bart., Sir John Evans, Colonel F. Farquharson, Sir W. H. Flower, Sir Geo. T. Goldie, General W. H. Goodenough, General Sir T. E. Gordon, General Gosset, Sir Charles Hall, Sir Henry Howorth, Mr. W. Hudleston, Professor D. E. Hughes, Mr. F. G. Jackson, General Sir Arnold Kemball, Mr. B. Kidd, Lord Lamington, Admiral A. H. Markham, Mr. Arthur Milman, Sir Frederick Milner, Bart., Mr. A. Milner, Mr. D. Morriss, Mr. J. Murray, General Mylne, Mr. C. E. Peek, Lord Percy, Señor Pezet the Peruvian Consul-General, Mr. E. G. Ravenstein, Sir Rawson W. Rawson, Lord

Ribblesdale, Sir A. Rollit, Mr. R. H. Scott, Mr. H. Seebohm, Lord Seymour, Mr. G. E. T. Smithson, Rev. S. A. Steinthal, Colonel H. C. B. Tanner, Mr. Maunde Thompson, Colonel Henry Trotter, Colonel J. K. Trotter, Admiral the Hon. W. J. Ward, Colonel C. M. Watson, Captain W. J. L. Wharton, R.N., Captain J. Wiggins.

After the usual loyal toasts, the PRESIDENT proposed the recipients of the Society's awards, to which Captain J. WIGGINS responded.

Sir GEORGE TAUBMAN GOLDIE proposed the "Guests," to which the Portuguese Minister responded.

The PRESIDENT proposed the "Sister Geographical Societies," which was responded to by Earl PERCY, President of the Tyneside Geographical Society.

The PRESIDENT proposed "The Navy and the Army," to which Rear-Admiral MARKHAM and Lieut.-General GOODENOUGH responded.

Sir ALBERT ROLLIT proposed the final toast, "The President," to which Mr. MARKHAM responded.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full :—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps—Tirol. *M. G. Ges. Wien* 37 (1894): 1-26. **Damian.**

Einzelne, wenig gewürdigte Hochgebirgs-seen und erloschene Seebecken um Sterzing. Von Josef Damian.

The author's earlier paper on the lakes near Trent was referred to in the Journal, vol. i. p. 350. Herr Damian now gives an account of the small Alpine lakes in the neighbourhood of Sterzing, and deduces various theoretical conclusions as to the formation of lake-basins in mountainous regions.

Austria—Bohemia. *Deutsche Rundschau G.* 16 (1894): 348-356. **Peter.**

Im Quellgebiete der Moldau. Ein Landschaftsbild aus dem Böhmerwalde. Von Johann Peter.

A short sketch of the country round the sources of the Moldau.

Belgium—Thielen. *B.S.R. Belge G.* 18 (1894): 138-152. **Harou.**

Géographie locale. Thielen. Par Alfred Harou.

Eastern Europe. **Cole.**

The Gypsy Road. A journey from Krakow to Coblentz. By Grenville A. J. Cole. With Illustrations by Edmund H. New. London and New York, Macmillan & Co., 1894. Size 8 × 5½, pp. x. and 166. *Price 6s. Presented by the Publishers.*

Messrs. Cole and New travelled over one of the great international roads of Europe on bicycles, and the record of their impressions in word and sketch is exceptionally fresh and interesting.

England—Parish Boundaries. *J. Manchester G.S.* **9** (1893): 91–103. **Crofton.**

Vestiges of Village Communities. By Mr. H. T. Crofton.

An important paper illustrated by a coloured map.

France. **Baedeker.**

Northern France from Belgium and the English Channel to the Loire, excluding Paris and its Environs. Handbook for Travellers. By Karl Baedeker. Second edition. With 9 Maps and 27 Plans. Leipsic, Karl Baedeker; London, Dulau & Co., 1894. Size 6½ × 4½, pp. xliii. and 411. *Price 7 marks. Presented by Messrs. Dulau & Co.*

Several new routes have been added to the present edition.

France—Flanders. **Malotet.**

Rev. G. **33** (1893): 413–421; **34** (1894): 34–45; 193–200; 276–282.

La Flandre Française. Par A. Malotet.

Herzegovina. **Déchy.**

Bergfahrten in den Alpen der Herzegowina. Von Moriz von Déchy. Seperat-Abdruck aus Nr. 350 und 351 vom 10 und 24 Juni 1892 der "Oesterr. Alpen-Zeitung." Vienna, 1892. Size 11½ × 8, pp. 16. *Plate. Presented by the Author.*

Hungary—Lake Balaton. **Loczy, etc.**

Rapport de la Commission d'Études du Lac Balaton pour 1891. (Extrait du bulletin de la Société hongroise de Géographie. Abrégé xix. année. Numero 9–10.) Size 9½ × 6, pp. 28. *Presented by Professor Loczy.*

This paper contains reports by Professor Loczy on the work of the Commission appointed for the scientific examination of Lake Balaton, and on the ancient terraces surrounding the lake bearing evidence as to its earlier levels. Dr. Vinzent de Borbas treats of the aquatic phanerogamic vegetation and floating islands, Dr. Istvanffi of the cryptogamic flora, and Dr. Eugene Daday of the microscopic fauna of the lake.

Italy—Lago di Cavazzo. *B.S.G. Italiana* (1894): 174–214. *Illustrations.* **Marinelli.**

Studi sul Lago di Cavazzo in Friuli, del socio Olinto Marinelli.

A survey of the lake of Cavazzo, with a photograph and a bathymetrical chart.

Rumania—Rivers. *B.S.G. Românа* **14** (1893): 1–320. **Chiru.**

Canalisarea Rîurilor si Irigatiuni de C. Chiru.

An elaborate treatise on the canalization of rivers and their adaptation for irrigating adjoining land, mainly with reference to the rivers of Rumania. It is illustrated by innumerable diagrams, and a series of five maps of the Rumanian drainage basins. It is unfortunate that the Rumanian Society does not follow the example of the Hungarian, and publish an abstract of its publications in one of the well-known languages of Western Europe.

Scottish Land-Names. **Maxwell.**

The Rhind Lectures in Archæology. Scottish Land-Names, their origin and meaning. By Sir Herbert Maxwell. Edinburgh and London, Blackwood & Sons, 1894. Size 8 × 6, pp. ix. and 219. *Price 6s. Presented by the Publishers.*

This work embodies the Rhind Lectures in Archæology for 1893. Two chapters are devoted to "the lesson of place-names," and show how by the names it is often possible to trace the ancient divisions of the land, the distribution of vanished tribes, the former extent of pasture and woodland, the progress of religious influence, and the like.

Meteorological Maps. **Russell.**

Pictorial Rain Maps. By H. C. Russell. [Read before the Royal Society of N.S. Wales, November 1, 1893.] Size 9 × 6, pp. 4. *Map.*

Meteorology. *National G. Mag.* **6** (1894): 35–62. **Harrington.**

Weather-Making, Ancient and Modern. Mark W. Harrington.

Meteorology—Anticyclones. **Russell.**

Moving Anticyclones in the Southern Hemisphere. By H. C. Russell. [From the *Quarterly Journal of the Royal Meteorological Society*, vol. xix., No. 85, January, 1893.] Size 10 × 6½. *Diagrams.*

Mountain ranges. *J. of Geology* **1** (1893): 542–573. **Le Conte.**

Theory of the origin of Mountain Ranges. By Joseph Le Conte.

A criticism of the chief modern theories of mountain formation, which concludes by the verdict that the old contractional theory of Earth-crumpling is more probably correct than Mr. Mellard Reade's Expansion theory, Mr. Dutton's Isostatic theory, or Professor Reyer's Gliding theory. The last-named theory was briefly described in the *Proceedings*, vol. 14 (1892), p. 630.

Oceanography. ——

Berichte der Commission für Erforschung des östlichen Mittelmeeres. Zweite Reihe. Aus den Denkschriften der kais. Akademie der Wissenschaften in Wien. Band 60. Vienna, F. Tempsky, 1894. Size 12 × 9½, pp. 128. *Numerous Plates. Presented by the Vienna Academy of Sciences.*

This part contains four memoirs on the work done on board the *Pola;* two zoological by Dr. Emil v. Marenzeller, a chemical report on the cruise of 1892 by Dr. K. Natterer, and the physical results of the same cruise by Professor J. Luksch. The work done on the *Pola* has been repeatedly referred to in the *Journal.*

Oceanography. *U.S. Coast and Geodetic Surv. Rep.*, 1891, *Pt. II.*: 343–364. **Haskell.**

On observations of Currents with the Direction Current-meter in the Straits of Florida and in the Gulf of Mexico, 1891. A report by E. A. Haskell.

Appendix No. 10 to the Coast and Geodetic Survey Report for 1891, with illustrative plates.

Oceanography—Gulf of the Lion. *C.R.* **118** (1894): 203–206. **Pruvot.**

Sur les fonds sous-marins de la région de Banyuls et du cap du Creus. Note de M. G. Pruvot.

Account of the configuration of the sea-bed of the Gulf of the Lion, which is separated into two relatively shallow, gently sloping flats by a deep trough running up to meet the mountainous promontory of Cape Creus, the eastern termination of the Pyrenees. On pp. 172-176 M. de Lacaze-Duthiers describes the vessel belonging to the Banyuls marine station, and the equipments with which the work discussed by M. Pruvot was carried out.

Physical Geography. **Bonney.**

The Story of our Planet. By T. G. Bonney, D.SC. London, Cassell & Co., 1893. Size 9½ × 6½, pp. xvi. and 592. *Price* 31*s.* 6*d. Presented by the Publishers.*

Professor Bonney gives a vigorous defence of plain language as applied to the exposition of scientific results in his preface, and in his finely illustrated volume he imparts the first principles of geology and physical geography in an eminently scientific yet absolutely popular way. The work is divided into five parts—(1) "The Story, its books and their speech," a summary of general principles; (2) "The processes of sculpture and moulding;" (3) "Changes from within;" (4) "The story of past ages," a sketch of systematic geology; (5) "On some theoretical questions," those treated being, The age of the Earth, The permanence of ocean basins and land areas, Climatal change, and The distribution and the descent of life.

River Temperature. *Ann. d. Hydr.* **22** (1894): 1–6. **Bubendey.**

Die Temperatur des fliessenden Wassers zur Zeit der Eisbildung. Von Wasserbau-Inspektor J. F. Bubendey.

Route-surveying. *M. Forsch. Deutschen Schutzgebiet* 7 (1894): 1–14. **Baumann.**
Topographische Aufnahmen auf Reisen. Von Dr. Oscar Baumann.

Practical hints on route-surveying with the compass and plane-table, with diagrams illustrating the construction of a route-map.

Volcanic Craters. *Petermanns M.* 40 (1894): 82–85. **Sapper.**
Kratertypen in Mexiko und Guatemala. Von Dr. Carl Sapper.
Illustrated by maps of typical craters.

GENERAL.

Bibliography—Simony. **Forster.**
Verzeichniss der in Druck veröffentlichter Arbeiten von Friedrich Simony zu dessen 80 Geburtstage am 30 November, 1893. Zusammengestellt von A. E. Forster und herausgegeben vom Geographischen Institut der k. k. Universität Wien. Wien, 1893. Size 10½ × 7, pp. 16.

The first entry in this list of the published writings of the venerable Professor Simony is dated 1842, the last 1893, and both refer to the Dachstein region. Between these dates 167 memoirs are specified, dealing mainly with Alpine observations on peaks, glaciers, lakes, and climate.

Biographical Dictionary. **Lee.**
Dictionary of National Biography. Edited by Sidney Lee. Vol. xxxviii.: Milman—More. London, Smith, Elder & Co., 1894. Size 10 × 7, pp. vi. and 455.

This volume includes notices of the following names, more or less connected with geography and travel:—Francis Maximilian Misson, by Thomas Seccombe, Sir Thomas Livingstone Mitchell, by Major Leonard Darwin; Robert Moffat, by Colonel R. H. Vetch; Herman Moll, by Gordon Goodwin; Lieut.-General William Monteith, by the late H. M. Chichester; Colonel Thomas George Montgomerie, by Colonel R. H. Vetch; William Moorcroft, by H. M. Chichester; Francis Moore and Robert Morden, by Gordon Goodwin.

Biography—Günther. *Deutsche Rundschau G.* 16 (1894): 276–278. **[Umlauft].**
Professor Dr. Siegmund Günther. *With portrait.*

Biography—Monaco. *Deutsche Rundschau G.* 16 (1894): 227–230. **Paulitschke.**
Albert I. Fürst von Monaco, von Ph. Paulitschke. (*Portrait.*)

Biography—Reclus. *Globus* 65 (1894): 121–123. **Wolkenhauer.**
Elisée Reclus. Von Dr. W. Wolkenhauer. (*With Portrait.*)

Biography—Reiss. *Deutsche Rundschau G.* 16 (1894): 326–328. ———
Dr. Wilhelm Reiss. *With portrait.*

Biography—Ruge. *Deutsche Rundschau G.* 16 (1894): 374–376. ———
Professor Dr. Sophus Ruge. *With portraits.*

Biography—Segato. **Wolynski.**
B.S.G. Italiana 5 (1892): 437; 6 (1893): 51, 238, 753, 888, 995.
Girolamo Segato, Viaggiatore, Cartografo e Chimico. Ricerche biografiche e geografiche del dott. Arturo Wolynski con documenti inediti.

Segato was one of the most remarkable African travellers of the early part of the century, whose maps of the Upper Nile and the adjacent desert were of great value. The documents, now published for the first time, include many family letters written from Africa.

Biography—Wolf. **Weilemann.**
Vierteljahrsschrift Naturforsch. Ges. Zürich. 39 (1894): 1–64.
Nekrolog auf Prof. Dr. Joh. Rudolf Wolf. Von Prof. A. Weilemann.

This important biography is illustrated by a portrait, and contains a complete bibliography of Professor Wolf's writings. A biography and portrait also appear in the *Deutsche Rundschau für Geographie*, vol. xvi. (1894), p. 279.

British Army. **Goodenough and Dalton.**
The Army Book for the British Empire. A record of the development and present composition of the military forces and their duties in peace

and war. By Lieut.-General W. H. Goodenough and Lieut.-Colonel J. C. Dalton, aided by various contributors. London (for H.M. Stationery Office), Eyre and Spottiswoode, 1893. Size 9×6, pp. xxii. and 612. *Maps. Price* 5*s*. *Presented by Colonel Dalton.*

Although the general purpose and contents of this book are outside the usually accepted limits of geography, it contains two maps which are not readily accessible elsewhere. One of these shows the military districts of the United Kingdom with their respective head-quarters, and the other gives the Indian and colonial military posts and the chief naval coaling-stations.

British Association Report. ———

Report of the Sixty-Third Meeting of the British Association for the Advancement of Science, held at Nottingham, in September, 1893. London, John Murray, 1894. Size 9 × 6, pp. civ., 935, and 118, charts. *Presented by the Association.*

British Empire. *Scottish G. Mag.* **10** (1894): 225-242. **Parkin.**

The Geographical Unity of the British Empire. By George R. Parkin.

Mr. Parkin seeks to prove that the title of his paper is no paradox, by tracing the historical expansion of the empire, and showing how each accession had its own place in an organic whole, to which each part was essential, supplying a want that no other could touch.

British Empire. **Wilkinson.**

The Great Alternative, a Plea for a National Policy. By Spenser Wilkinson. London, Sonnenschein & Co., 1894. Size 8½ × 6, pp. 331. *Price* 7*s*. 6*d*. *Presented by the Publishers.*

The "alternative" proposed involves the question, "Will the British Empire stand or fall?" The question is, of course, purely political, but in so far as many of the conditions have a geographical basis, the work has a certain geographical value.

Commercial Geography—Seaports. **Dorn, etc.**

Die Seehäfen des Weltverkehrs dargestellt von Josef Ritter von Lehnert, Johann Holeczek, Dr. Karl Zehden, Dr. Theodor Cicalek, Ernst Becher, Rodolf Pajer, Adolf Schwarz, unter Redaction von Alexander Dorn. Two vols. I. Häfen Europas sowie der asiatischen und afrikanischen Küsten des Mittelmeerbeckens, pp. xii. and 1100, with 98 illustrations and 137 plans. II. (additional authors—R. Müller, F. R. Müller von Elblein, E. Edlen von Friedenfels, and Alfred Freiherr von Koudelka) Häfen ausserhalb Europas und des Mittelmeerbeckens. Pp. viii. and 828, with 75 illustrations and 79 plans. Vienna, Alexander Dorn, 1891, 1892. *Price*, vol. i., 23*s*.; vol. ii., 19*s*.

Discovery—Cousin. *B. S. G. Madrid*, **36** (1894): 84-93. **Duro.**

Juan Cousin, verdadero descubridor de América, según el capitán inglés Gambier, R.N., por D. Cesáreo Fernández Duro.

A review of Captain Gambier's paper in the *Fortnightly Review* of January, 1894.

Discovery of America. **Nocentini.**

La Scoperta dell' America, attribuita ai Cinesi. Relazione di Lodovico Nocentini. (Extract from Proceedings of the Genoa Geographical Congress.) Size 10½ × 6½, pp. 12. *Presented by the Author.*

A disquisition on the supposed Chinese discovery of America.

Druids. **Bonwick.**

Irish Druids and Old Irish Religions. By James Bonwick. London, [Sampson Low & Co.], 1894. Size 7½ × 5½, pp. viii. and 328. *Price* 6*s*.

In a lengthened course of general reading, Mr. Bonwick has collected a great deal of information relating to the ancient Druids and to the early religions of the Irish race, which he has embodied in the present volume. His book, to a large extent, consists of a collection of quotations from various writers, and is mainly of historical interest.

Educational. *Verh. X. Deutschen G.-tages* (1893): 116-126. **Neumann.**

Die Geographie als Gegenstand des akademischen Unterrichts. Von Prof. Dr. L. Neumann.

On Geography as a University subject.

Educational. *Verh. X. Deutschen G.-tages* (1893): 127–133. **Kirchhoff.**

Uber die Vorbereitung der Geographielehrer für ihren Beruf. Von Prof. Dr. A. Kirchhoff.

Educational. **Lyde.**

A Commercial Geography of the British Empire. By Lionel W. Lyde, M.A. London, Methuen & Co., 1894. Size 7½ × 5, pp. x. and 156. *Price 2s. Presented by the Publishers.*

Any attempt to treat the Commercial Geography of the British Empire on so microscopic a scale must be deemed extremely successful if it escape utter failure. Mr. Lyde has planned his work well, and executed it fairly. Such mistakes as the following should have been detected and removed in revision. Mentioning nitrogen and oxygen as "compounds," describing vapour as composed of "two elements—liquid which falls and heat which rises," the sentence, "Australia has *no* mountains of any really serviceable height!" the statement that the regularity of the north-west anti-trades in the South Atlantic is "due probably to the existence of active volcanoes on high land within the Antarctic circle," the repetition of the error that the sheltered west coast of the mainland of Scotland is "much more broken than the eastern owing to its being exposed to the force of the Atlantic waves and winds," treating Burma as a separate country from India, and referring to "the *nominal* equator." There is a tendency throughout to hasty generalization and a general disregard of the true difficulties besetting such a subject.

Geography—General. **Scobel.**

Geographisches Handbuch zu Andrees Handatlas mit besonderer Berücksichtigung der politischen, kommerziellen und statistischen Verhältnisse. Unter Mitwirkung von A. v. Danckelman, H. Gebauer, E. Jung, F. v. Juraschek, O. Krümmel, Ph. Paulitschke, W. Petzold, H. Polakowsky, J. Rein, S. Ruge herausgegeben von A. Scobel. Bielefeld and Leipzig, Velhagen and Klasing, 1894. Size 9½ × 6½, pp. viii. and 687. *Presented by the Publishers.*

This companion to Andree's Handatlas is really an extremely compact and well-balanced treatise on geography.

Historical. **Collingridga.**

The Fantastic Islands of the Indian Ocean and of Australasia in the Middle Ages, and their significance in connection with the early Cartography of Australia. By George Collingridge. [No place or date of publication] (1893?). Size 10½ × 6, pp. 14. *Presented by the Author.*

Ice-destruction. *R. maritime et Coloniale* **121** (1894): 18–48. **Dibos.**

Note sur les Travaux de Déglaçage dans les estuaires fluviaux et maritime. Par Maurice Dibos.

This paper will be the subject of a special note.

Maps. *U.S. Coast and Geodetic Surv. Rep.*, 1891, *Pt. II.*, 565–746. ———

Proceedings of the Topographical Conference held at Washington, D.C., January 18 to March 7, 1892.

This Conference of the officials of the American Surveys deals with a number of important questions bearing on surveying and mapping, including the discussion of instruments and methods, the comparison of European and American surveys, and a great deal of miscellaneous information and expressions of opinion from different surveyors on the points discussed.

Mountaineering. **Coolidge.**

Was ist eine "Erste Besteigung"? Von Rev. W. A. B. Coolidge. Separat-Abdruck aus Nr. 375, vom 26, Mai 1893 der "Oesterr, Alpen-Zeitung." Size 10½ × 7½, pp. 6. *Presented by the Author.*

Oriental Literature. **Müller.**

The Sacred Books of the East . . . edited by F. Max Müller. Vol. XLI. Oxford, the Clarendon Press, 1894. Size 9 × 6, pp. xxvii. and 424. *Presented by the Secretary of State for India.*

World-divisions. *Verh. X. Deutschen G.-tages* (1893): 188–198. **Hettner.**

Über den Begriff der Erdteile und seine geographische Bedeutung. Von Dr. Alfred Hettner.

Yachting. ———

Yachting. [Vol. I.] By Sir Edward Sullivan, Bart., Lord Brassey, C. E. Seth-Smith, G. L. Watson, R. T. Pritchett, Sir George Leach, the Earl of Pembroke and Montgomery, E. F. Knight, and Rev. G. L. Blake. [Vol. II.] By R. T. Pritchett, the Marquis of Dufferin and Ava, James McFerran, Rev. G. L. Blake, T. B. Middleton, Edward Walter Castle and Robert Castle. G. Christopher Davies, Lewis Herreshoff, the Earl of Onslow, H. Horn, Sir George Leach. London, Longmans & Co., 1894. Size 8 × 5½, pp. (vol. i.) xvi. and 439; (vol. ii.) xvi. and 456. *Illustrations. Price* 10*s.* 6*d. each vol. Presented by the Publishers.*

The most geographical of all sports is well treated from most standpoints in these volumes. We miss, however, such a chapter on yachting for scientific purposes as the Prince of Monaco might have written.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

Alps. **Deutschen u. Oesterreichischen Alpen-Verein.**

Oetzthal and Stubai. Scale 1 : 50,000 or 1·2 stat. miles to an inch. Blatt IV., S. Weisskugel. Herausgegeben v. Deutschen u. Oesterreichischen Alpen-Verein. 1893. Stich u. Druck v. Giesecke & Devrient, Leipzig u. Berlin. *Presented by the Deutschen u. Oesterreichischen Alpen-Verein.*

This map is based on the surveys of the Austrian Military Geographical Institute The topographical features are shown by a combination of contours and shading, and numerous heights are given in metres. The contours on glaciers are given in blue, all others being coloured brown. The lettering is clear, and the whole effect is very pleasing and satisfactory.

England and Wales. **Wells.**

Map of Canals and Navigable Rivers of England and Wales. By Lionel B. Wells, M.I.C.E., late engineer to the River Weaver Navigation. Scale 1 : 1,130,000 or 15·5 stat. miles to an inch. S. Falkner & Sons, London. *Price* 3*s.*

In this map Mr. Wells shows the present state of the inland navigation of England and Wales. Independent navigable rivers and canals are indicated by blue lines, the railway-owned navigation by red, and abandoned canals by broken lines. The capacity of each river or canal, with regard to navigation, is clearly indicated, and at the foot of the map a large amount of information is given in tabular form.

England and Wales. **Ordnance Survey.**

Publications issued since May 8, 1894.

1-inch :—

England and Wales :—132, 242, with hills photozincographed in brown, 1*s.* each.

Special map of Nottingham and its environs, 1*s.* 6*d.*

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25-inch—Parish Maps :—

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Town Plans—5-feet scale:—

Ashton-under-Lyne and Stalybridge (Revision), X., XIII., 2*s*. 6*d*. each.

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Plymouth and Environs, CXXIII. **8**, 22; CXXIII. **12**, 14, with houses stippled, 2*s*. 6*d*. each.

(*E. Stanford, Agent.*)

Sweden. **Generalstabens topografiska afdelning, Stockholm.**

Generalstabens karta öfver Sverige. Scale 1: 100,000 or 1·5 stat. miles to an inch. Sheets: 80, Uddeholm; 81, Filipstad.—Karta öfver Norbottens Län. Scale 1: 200,000 or 3·1 stat. miles to an inch. Sheets: 26, Löfmokk; 27, Arjepluog; 28, Stenträsk; 29, Harads; 30, Öfver Kalix; 35, Arvidsjaur. Generalstabens topografiska afdelning, Stockholm. *Presented by Topographical Section of the Swedish General Staff.*

ASIA.

Indian Government Surveys.

Indian Atlas, 4 miles to an inch. Sheets: No. 104, Parts of Districts Mirzapur (N.W. Provinces), Shahabad, Gaya, etc. (Bengal), with additions to 1892. No. 113, Parts of Districts Birbhum, Burdwan, etc. (Bengal), with additions to 1893. Quarter sheets: No. 67, S.E. Parts of Districts Bareilli, Pilibhit and Shahjahanpur (N.W. Provinces), and Kheri (Oudh), with additions to 1892. No. 103, N.W. Parts of Districts Darrang, Sibsagar, Nowgong, Lakhimpur, Naga Hills (Assam), and Daphla Hills. Additions to 1890.—North-West Provinces and Oudh Survey, 1 inch to a mile. Sheets: Nos. 39A, 40, 41, 56A, 57, 58, 59, 77, 78, 79, 80 (Preliminary editions), District Jhansi. Seasons 1888–90. Sheet: No. 160, District Gonda and Bahraich. Seasons 1866–70.—Lower Burma Survey, 1 inch to a mile. No. 226, Parts of Districts Prome, Tharrawaddy, and Toungoo. Seasons 1886-91.—North-East Frontier, 1 inch to 4 miles. Sheet: No. 23, N.W. Parts of Districts Bhamo, Upper Chindwin, and Katha (Upper Burma).—North-Eastern Frontier, 1 inch to 8 miles. Sheet: No. 15 (third edition), Parts of Districts Sylhet, Cachar, Naga Hills, Manipur, etc.—South-Eastern Frontier, 1 inch to 4 miles. Sheet: No. 4, N.E. (fifth edition), Part of Northern Shan States. Seasons 1887–93. No. 4, S.W. (seventh edition), Parts of Districts Ruby Mines, Shwebo, Saging, and Mandalay (Upper Burma), and of the Northern Shan States. Seasons 1886–93.—South-Eastern Frontier, 1 inch to 8 miles. Sheet No. 3 (second edition), Parts of Districts Minbu, Magwe, and Pyinmana (Upper Burma), and of Akyab, Kyaukpyu, Thayetmyo, Toungoo, etc. (Lower Burma), 1893. No. 7 (second edition), Parts of Districts Shewegyin, Amherst, Salween, Tharrawaddy, etc. (Lower Burma), and part of the Kingdom of Siam, 1893.—Map of Sind, 1 inch to 16 miles. Additions to Dec., 1892.—Skeleton Map of the Punjab and Surrounding Countries, 1874, 1 inch to 32 miles. Additions to 1892.—Route Map of the Western Himalayas, Kashmir, Punjab, and Northern India, with portions of Afghanistan, Baluchistan, etc. (including the former Kashmir Route Map), 1 inch to 32 miles, with additions to Railways, 1893, with a pamphlet.—Map of the North-West Provinces and Oudh in April, 1893, 1 inch to 32 miles. Accompaniment to the Annual Administration Report, N.W. P. and Oudh, P. W. D. B. and R. Branch for the year 1892–93.—Map of the Allahabad Division, prepared in accordance with Govt. N.W. P., P. W. Department. Circular No. "E.," dated May 16, 1872. Revised up to April 1, 1892.—The Province of Assam under the jurisdiction of the Chief Commissioner, with the adjacent hills. Scale 1 inch to 8 miles, in 9 sheets. Sheets Nos. 4 and 9.—District Hooghly, 4 miles to an inch. Additions to Nov., 1892.—District Sisapur, N.W. Provinces and Oudh. Scale 1 inch to 8 miles.—District Rae Bareli, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Murshidabad, Bengal, 1 inch to 8 miles, 1893.—District Fatehpur, N.W. Provinces and Oudh, 8 miles to an inch, 1893.—District Cawnpore, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Fizabad, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Hardoi, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.

—District Faridpur, Bengal, 1 inch to 8 miles, 1893.—District Farukhabad, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Bareilly, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Bijnor, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Buduan, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Agra, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Banda, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—District Bara Banki, N.W. Provinces and Oudh, 1 inch to 8 miles, 1893.—Districts of Akola and Buldana, Hyderabad Assigned Districts, 1 inch to 8 miles, 1893.—Districts Amraoti and Ellichpur, Hyderabad Assigned Districts, 1 inch to 8 miles, 1893.—Districts Wun and Basim, Hyderabad Assigned States, 1 inch to 8 miles, 1893.—District Cachar, Assam, 1 inch to 8 miles, 1893.—District Goalpara, Assam, 1 inch to 8 miles, 1893.—District Sylhet, Assam, 1 inch to 8 miles, 1893.—Upper Burma, 16 miles to an inch, 1893. 2 sheets.—Indo-China (East of Longitude 96 E.), 1 inch to 32 miles. 2 sheets.—District Naga Hills, Assam, 4 miles to an inch. Second edition, 1893.—District Ruby Mines, Upper Burma, 4 miles to an inch, 1893.—Preliminary Chart of the principal Triangulation of the Mandalay Meridional Series, No. 4, Season 1892–93, 1 inch to 4 miles, 1893.—Chart of Triangulation Madras Forest Survey, Coimbatore District (Coimbatore Taluk). Season 1890–91. With a list of Latitudes, Longitudes, Heights, and Azimuths.—Chart of Triangulation Madras Forest Survey, Coimbatore District (Udamalpet and Pollachi Taluks). Seasons 1890–92. With a list of Latitudes, Longitudes, Heights, and Azimuths, 1893. *Presented by H.M. Secretary of State for India, through India Office.*

AFRICA.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte topographique de l'Algérie. Scale 1:50,000, or 1·2 inch to a statute mile. Service Géographique de l'Armée, Paris. Sheets:—Nos. 60, Oued Damous; 69, Aïne Roua; 81, Warnier; 91, Bordj Boni; 96, Oued Athmenia; 98, Aïne Regada; 242, Mercher Lacombe. *Price 1 fr. 50 c. each sheet.*

Congo. **Pobéguin.**

Atlas des Côtes du Congo Français en vingt-deux feuilles à l'Echelle de 1:80,000 or 1·2 statute miles to an inch. Paris, 1893. Reconnaissance faite en suivant le Rivage par Henri Pobéguin, chef de Station, Février & Août, 1890, 25 Janv., 27 Juin, 1891. Carte dressée d'après les carnets et les Observations astronomiques antérieures.

This series consists of twenty-two maps, embracing the coast-line of the French possessions in the neighbourhood of the Congo from Campo to Massari. Though the information contained in these maps only extends for a short distance inland, many details are given that are not to be found elsewhere.

Egypt. **Egypt Exploration Fund.**

An Atlas of Ancient Egypt. With complete Index, Geographical and Historical Notes, Biblical References, etc. Special publication of the Egypt Exploration Fund. London: Kegan Paul, Trench & Co. B. Quaritch, Asher & Co., and Egypt Exploration Fund. 1894. *Price 3s. 6d.*

This atlas has been published by the Egypt Exploration Fund, to supply a want that has been greatly felt by students, of an atlas in which could be found the latest identifications of ancient sites, and the important geographical discoveries which have resulted from the work of the Fund in Egypt.

This atlas contains the following maps:—I., Ancient Egypt and Adjacent Countries; II., Modern Egypt and Adjacent Countries, with an inset showing the principal geological features; III. to V., Ancient Egypt from the Delta to Philæ; VI., VII., Ethiopia; VIII., Goshen and the probable route of the Exodus. The maps are furnished with notes of historical interest, and are accompanied by letterpress containing valuable and instructive information.

AUSTRALIA.

Queensland. **Jack, and others.**

Geological Map of Charters Towers Goldfield, Queensland. Geological Lines by R. L. Jack, W. H. Rands, and A. Gibb Maitland. Scale 4 chains to an inch. Topography, William Thompson, 1894. 6 sheets. *Presented by R. L. Jack, Esq., through Agent-General for Queensland.*

GENERAL.

Historical Geography. **Schrader.**

Atlas de Géographie Historique. Ouvrage contenant 54 Grandes Cartes doubles en couleurs, accompagnées d'un Texte Historique au dos et d'un grand nombre de cartes de Détail, Figures, Diagrammes, etc. Par une Réunion de Professeurs et de Savants, sous la direction géographique de F. Schrader. Directeur des travaux cartographiques de la librairie Hachette et C^ie^. Paris: Librairie Hachette et C^ie^. Part 7. *Price* 1 *fr.* 50 *c.* *Presented by the Publishers.*

Sheet 37 is a map showing the successive extensions of the Empire of Russia from the middle of the thirteenth century to the present day. Sheet 42 contains six maps of France on which political, administrative, judicial, and ecclesiastical divisions are shown. Sheet 12 is a map illustrating the progress of Roman Conquests under the Empire. The notes which accompany the maps have been written by MM. A. Debidour, D. Aïtoff, and Paul Guiraud.

The World. **Vidal-Lablache.**

Atlas Vidal-Lablache, Maitre de Conférences de Géographie a l'École Normale Supérieure. Histoire et Géographie, 137 Cartes, 248 Cartons. Index Alphabétique de plus de 40,000 noms (L'Atlas complet paraîtra en 24 livraisons). 24^e^ livraison. Paris: Armand Colin et C^ie^., Editeurs. *Price* 1 *fr.* 25 *c. each part.*

The present issue, which contains maps of the south-east frontier of France, Cochin China, and French Cambodia, Indo-China, Tonkin, and the States of the Andes and River Plate, completes the atlas. In addition to these, a special sheet is given, containing specimens of cartography taken from maps, drawn on a large scale, together with the title-page and preface. The index, which will be issued as a supplement, will be supplied at the price of two francs. Taken as a whole, this is a very useful atlas, each map being accompanied by explanatory notes, which will be of great assistance to students.

The World. **Vivien de Saint-Martin & Schrader.**

Atlas Universel de Géographie construit d'après les sources originales et les documents les plus récents cartes, voyages, mémoires, travaux géodésiques, etc. Avec un Texte Analytique. Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. Sheet No. 78, Amérique du Sud, feuille Nord-Est. Paris: Librairie Hachette et C^ie^. *Presented by the Publishers.*

The several issues of this atlas have been published at uncertain intervals during the past thirteen years, and thus some of the earlier sheets do not represent the present state of our geographical knowledge. In this instance, the north-east sheet of a map of South America is given, and, like all the previous maps of this atlas, is an excellent specimen of cartography, which only makes it the more to be regretted that at the present rate of publication it will be several years before the atlas will be completed.

PHOTOGRAPHS.

Ooregum Gold Mines. ———

Album containing 20 photographs of the Ooregum Gold Mines, Mysore, India. *Presented by C. H. Wallroth, Esq.*

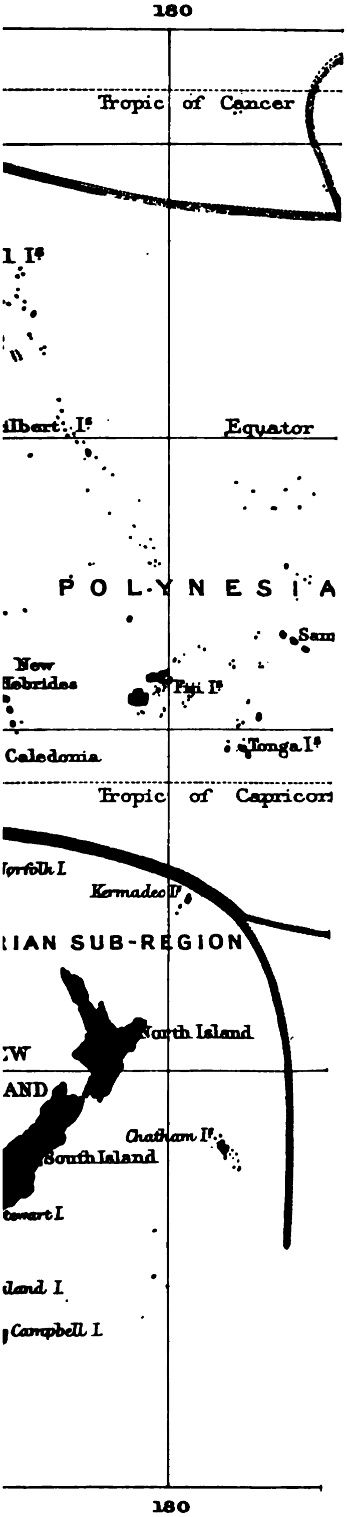
This is a very interesting set of views of the Ooregum Gold Mines, in the Kolar District, Mysore. The series consists of twenty excellent photographs, which have been placed in an album and presented to the Society by Mr. C. H. Wallroth, who has on previous occasions contributed largely to the Society's collection of photographs.

Uraguay. **Fitz Patrick.**

Twelve photographs of the Central Uruguay Railway, taken by Fitz Patrick, Rincon, 1894. *Presented by Leonard Cooper, Esq.*

These are views taken at different points on the Central Uruguay Railway, and illustrate the nature of the works and general features of the country through which it passes.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



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PEOPLE, PLACES, AND PROSPECTS IN BRITISH EAST AFRICA.

By C. W. HOBLEY, Assoc. M. Inst. C.E.

During about three and a half years of service with the Imperial British East Africa Company, I travelled over a considerable portion of their territory, some of it comparatively new ground, and I have now been asked to lay before the Society a few particulars of my observations.

I will in the first place deal with sundry notes made during a voyage of exploration up the river Tana in the stern-wheel steamer *Kenya* in 1891.

The first point that strikes one about the Tana is the bar at its mouth, and the peculiar way in which the river runs nearly parallel to the shore for some distance before emptying itself into the sea. Probably the Tana formerly debouched into a wide estuary which ran back many miles inland, but since then the whole coast-line has been raised, and monsoons have piled up the great series of sand dunes which fringe the coast, and of which the Kitanga Tanga Hills, a few miles up the river, are only examples of a little earlier date; so that it is a continual fight between the tidal currents and monsoons which choke up the river mouth, and the ebb tide and current of the river which try to keep the passage clear. The fringing coral reef which runs up and down the coast protects the loose sandy material already piled up. The mouth of the river is almost indistinguishable from seawards; the only thing that gives one a hint of its location is a large fan-shaped body of yellowish muddy water which stretches two or three miles out to sea, and if tasted will be found nearly fresh.

Immediately behind the sandhills there occurs a considerable tract of low-lying swampy ground covered with mangrove forest and very rank vegetation, studded with several salt lagoons.

The mangrove, or boriti timber, as it is locally termed, is very fine in this lower portion of the river, and being so near to the coast ought to be of great value. It is used principally for building purposes, its principal feature being the straightness of the spars, the evenness of the grain, and it is, moreover, proof against the white ant; straight spars of 50 or 60 feet in length are easily obtained.

The tidal influence is felt to a distance of about 12 to 15 miles up the Tana. There are evidences that the Ozi and Tana mouths were both originally outlets for one big river, and the area between being a sort of delta of alluvium. Dr. Gregory observed on Kenya evidences of a much more extensive glaciation in past times, which would lead one to infer either that the mountain was much higher then, or the climate was much colder; it is possible that this increase of the ice-cap occurred during that great oscillation of the pole which caused the glacial age. But to whatever cause due, the melting of this enormous quantity of ice would account for the presence of a vastly larger quantity of water in the river in past ages.

The valley of the Tana, throughout the whole of its navigable length, is of enormous width, the river flowing through this vast plain, and generally confined by low banks, so that after the rains it floods the country on either side, thus providing a perennial fertilizer.

Owing to the excessive winding, the river has formed what are called on the Mississippi "cut-outs;" these phenomena occur when the winding is so acute that a piece of the river takes the form of a loop, and in time the neck of the loop gets worn through, and the waters rush through the opening with the force due to the fall in the whole distance round the loop, and the force of this current soon carves a wide channel through the neck. The swampy lake of Ashakubabo, near Ngao, is a fine example of the formation of a lagoon through the agency of one of the "cut-outs" previously referred to, the river having formerly flowed round the head of this lake; a "cut-out" has then taken place, and the two ends of the bend have been gradually silted up, the water of the lake being annually replenished at flood-time.

The action of the river in carving away its banks goes on at a very rapid rate, as is demonstrated by the deserted French mission at Ndera. This house was built on the concave side of a sharp bend, and the river has eaten away the bank so rapidly that although the place was only built about the year 1889, half the house has now been washed away by the water, which is carving away the bank at the rate of nearly 3 feet a year.

The absence of tributaries is rather a striking feature in the lower part of the river, but it is partly due to the enormous width of plain on either side, and there is no decided drop in any one direction, so the rain-water sinks in generally all over the surface, only collecting a little in shallow lagoon-like pools, which all evaporate in the dry season; moreover, as far as our observations extended, they seemed to show that the rainfall is much slighter in the steppes of the Tana valley than at the coast, or in the mountainous regions like Ukambani.

There is a large district at the mouth of the river up to Ngao, and across to the Ozi, where the country is flooded on either side for miles at the season of high river. The proportion of this tract at present under cultivation is a very small fraction of the area, and there is here ready at hand a large area eminently suited for native agriculturists for the production of rice, the Tana being on one side and the Ozi on the other in direct communication with the sea, which is only about 12 or 15 miles distant; although the Tana mouth, it is true, is crippled to a certain extent by the presence of a bar. On account of this, a work that would help greatly the development of the region would be the widening and deepening of the Bellazoni canal. This canal was dug by the former Sultan of Witu, Fumo Bakari, by means of slave labour, in order to provide for the passage of canoe traffic between the Tana and Ozi. It is now only a mere narrow winding ditch, along which canoes can barely pass; if it could be straightened and widened so as to provide a permanent waterway between the two rivers, the benefit to the Tana trade would be incalculable; the material to be excavated is only black alluvial earth.

From Ngao to Ngatana is a very thinly populated region, and large tracts on the right bank are well suited for rice cultivation; but from Ngatana to Ndera the banks are lined with villages, and a great proportion of the land is under cultivation for rice and bananas. Beyond Ndera, between that place and Kinakombe, there is a considerable amount of cultivation, but it is interfered with in a great measure by long stretches of thick woods; the lazy Wapokomo do not care for the labour of clearing away the woods in order to make plantations, and native tools, too, are very inadequate for work of this sort.

Above Kinakombe there is very little cultivation on the left bank on account of the raids of the Somalis. Nearly every year in the dry season, about February and March, when the river is very low, they come down to the river and carry off the Pokomo women and children for slaves, and the Pokomos never dream of offering any resistance; this proceeding naturally has a blighting influence on the people, besides robbing the country of its working population. The Pokomos were also worried by the ruffianly marauders from the Witu district, who came up in canoes, cheated the natives out of their ivory, and stole their produce. This went on on a large scale until the Witu defeat in 1890; since then it has been greatly reduced, and, with an efficient administration on the Lower Tana, it can be entirely stopped with comparative little trouble. The Somali-raiding is a far more serious trouble, of which it is not easy to see a solution. These raiding bands sweep down through the dry steppes which bound the Tana valley, and appear unexpectedly in the Pokomo villages and plantations, seize all the women and children they can lay hands on, and disappear once more. The sphere of their raiding stretches from about Ndera, right up to Korokoro. During our stay at Hameye, a band of Somalis came down and carried off several Galla women from the villages about two days below the station.

A few miles above Kinakombe, on the left bank of the river, there is a high bank on the concave side of a bend of the river; this is a very favourite spot for the Somalis to strike the river. It is called Gubaida, and a Somali path comes right down to the river here. Possibly an outpost at this spot might have a beneficial effect in checking the marauders.

Some distance above Gubaida is Koni, which is the centre of a prosperous district. A good deal of grain is produced, and a considerable amount of orchella-weed occurs in the woods, fringing the river around this place.

From Koni upwards as far as Sissini the population is rather thick, but they cultivate very little more than is necessary for their own requirements; in fact, in places considerable difficulty was experienced in feeding our caravan. Above the Malalulu district the population rapidly begins to thin, with the exception of a thick cluster of villages around Ripa and Masa, and continues to do so until Kidori, where it practically ceases. Ripa and Masa were, I believe, according to Denhardt, formerly supposed to refer to the same place; but we found that Ripa was to the south, Masa being 2 or 3 miles further north. In this district many fine trees are found; they are known to the Swahilis by various names, viz. Mvule, Mfuni, and Mparaumsi; they have a straight stem about 3 to 4 feet in diameter, and run to a height of 80 or 90 feet; they have a cream-coloured bark, no lateral branches, but a large umbrella-shaped mass of foliage at the summit. The wood is light-coloured and regular in growth, easily worked, and is consequently much prized for canoe manufacture. The natives tell you that it is the only tree the snake is unable to climb.

Kidori may be called the boundary of the Lower Tana, for here the Pokomo population entirely ceases, and consequently all cultivation; for the natives, instead of showing signs of spreading northwards, seem to be decreasing in numbers.

Leaving Kidori, you enter a new region with magnificent unbroken forest on either bank, occasionally coming across a few rough huts belonging to Wasania hunters, who lead a sort of nomadic existence, being usually right away in the steppes elephant-hunting, and in times of scarcity of water coming down to live by the river. We steamed for four and a half days through this uninhabited region, and the belt of forest on either bank is very dense throughout. There are few spots, very few, where the line of forest is broken for a hundred yards or so, and the dry steppe land runs down to the water's edge; it is at these spots that caravans, marching parallel to the river, can come down and get water. There are long lines of trees very like the English poplar, and as large; they fringe the river nearly continuously throughout this district, and onwards at intervals until Hargazo is reached, where a little beyond the falls they entirely cease. These forests are so extensive, and contain such fine timber, that they are worthy of some attention; and as the demand for timber on the coast increases, a lumber trade on the Tana ought to prove a financial success; the logs could be fastened together into rafts, and so floated down the stream.

Emerging from this region, the Korokoro district is reached, and one or two scattered Galla villages. The head Galla chief Sadeh lives in the lower part of this district, near Odo Borroruva. In a deserted Galla village near this spot, a curious relic of Peters' expedition was found, namely, a couple of solid drawn loaded cartridges with steel projectiles for Peters' Hotchkiss cannon, evidently stolen from his camp by the Gallas. At the upper end of the island of Odo Borroruva, at a place called Galanabe, the main Galla settlements are now situated; the reason for their moving to this spot being the near proximity of some large swamps, where they and the Wapokomo flee upon the approach of raiding bands of Somalis or Wakamba. The entrance to these retreats is artfully concealed; it consists of a very low passage in thick foliage just high enough to admit of a small dug-out canoe, the occupants of which have to lie down and work themselves along the passage by means of the boughs above. The Wapokomo in the Korokoro district are very different from those of the lower river; and, although not so nominally, they are virtually slaves of the Gallas, and a great proportion are half-caste Galla and Wapokomo.

About a mile above the settlements of Galanabe is the site of the station built by Mr. Pigott at Bokore. This is now entirely demolished, with the exception of a flag-staff, probably destroyed by Gallas or Wakamba. Opposite Bokore is the embouchure of a small arm of the river, which forms a low-lying island, stretching several miles, similar to that which forms the island of Odo Borroruva. A good day's steaming above Bokore brought us to Balarti, the Company's station, which is situated about 12 miles below Hameye or Baza, the residence of the old Pokomo chief, Eribaidima. This village forms the extreme limit of Pokomo occupation on the Tana. The site of the Company's station Balarti is a very pleasant one, situated high above the river, and quite dry at all seasons; and east and west of it are fine stretches of land capable of cultivation, and even at highest flood it has uninterrupted access to the steppe land at the back.

The climate at Balarti is very pleasant, but of course, our observations only extending over a little more than three months, they cannot be taken as a yearly average. The temperature was very moderate. There were pleasant breezes both by day and night, and there was no dew. The average barometrical pressure and temperature during the period of about three months, from June to August, was as follows:—

	6 a.m.	12 p.m.	6 p.m.
Average barometrical pressure	29·89	29·87	29·79
Average temperature in shade	69·0°	84·0°	81·5°

It is to be regretted, however, that we had no instruments with us with which to obtain results as to the moisture of the atmosphere. During the whole of the time a south-west monsoon blew strongly every day. The weather was fine, but occasionally cloudy.

A thoughtful observer standing on the banks of the river at high flood, and watching the powerful turbulent chocolate-coloured stream rush by, cannot fail to be struck with the terrible amount of waste going on—waste of water and power which might be used for irrigation, and waste of a vast amount of fertilizing material, both things of golden worth in a tropical land. If this turbid torrent could be made to deposit its mud upon the flat steppe lands of the valley, instead of going to form a fan-shaped sedimentary deposit in the sea about the mouth of the river, the benefits would be incalculable. At present the muddy waters of the river discolour the sea for some miles away from the mouth, and some thousand tons of rich fertilizing material must be deposited yearly around the mouth of the river, choking up its exit, instead of transforming many square miles of barren land into a fertile, productive, and remunerative tract.

With regard to the irrigating power of the river, it is at present entirely uncontrolled; at one time there is too much water and at another time too little, but by suitable engineering works it might be properly regulated and its influence immeasurably extended. The height of the station at Korokoro is 460 feet above sea-level, and a barrage or dam in this neighbourhood, raising the level of the river at least 30 feet, would enable several hundred square miles of country to be irrigated. Below Korokoro the construction of a dam would be a matter of great difficulty, owing to the absence of stone, but great results might be achieved by the proper utilization of the water-power of the river. It could be easily employed to raise water, which could be stowed in large reservoirs, and thence led over the country to assist the culture of rice and cotton. These improvements once carried out, one could safely prophesy that the prosperity of the Tana valley would exceed that of any other area in our East African possessions.

We will now deal with the tribes inhabiting the Tana basin. All tribes of this part of Africa may be divided into two classes, pastoral and agricultural. Pastoral tribes, from the fact of their having to follow the pasture necessary to graze their flocks, are more or less nomadic. Agricultural tribes, on the other hand, always inhabit a fixed location. Pastoral tribes, whenever they become degenerate, or in any way worsted in the struggle for existence, take upon themselves the habits of an agricultural tribe; the converse is never the case. With regard to the Tana, the tribes met with from the mouth of the river up to Hameye, are the Wapokomo, Gallas, Waboni, and Wasania. The Wapokomo are essentially an agricultural tribe. They inhabit the river on both sides, and are never found living away from the immediate vicinity of its banks. They belong to the Bantu race, and are closely allied to the tribes which inhabit the east coast immediately behind the coast-line from Lamu down to the river Rufiji, and of which the Wanyika, Wagiriama, Wadigo, and Wazaramu are collateral branches. Living on the river for generations, these people have made it their highroad, all their internal communications being carried on by means of canoes. Nearly every family in every village possesses one or more canoes. These canoes, which are often 30 or 40 feet in length, and seldom more than 2 feet in width, are very skilfully made, being hollowed out of the solid trunk of a tree by means of very primitive tools. They are very skilful boatmen, are all very expert swimmers, and are the only tribes I have seen who do not fear the crocodiles, with which the river abounds; one of their great sports being crocodile and hippo hunting. Although they have no very big chiefs, there is usually in each district a headman in one village, who commands a certain amount of respect throughout that district. The chief Nife of Ndera or Kosi is an example of such a man. The majority of the Wapokomo have adopted the Moslem faith, but a great deal of savage superstition still survives amongst them. For instance, in all villages there is a sort of shed under which the elders sit and discuss matters; the innermost part of this shed is partitioned off, and only the grown-up men are allowed to enter; all young men upon attaining manhood have to be initiated into the mysteries of this inner chamber. There is one curious superstition, that of the "Golahoi," which is found among the people of the lower river. There are certain stretches of forest between Ndera and the coast which this creature is said to inhabit. The story is that a man walking alone through these woods will sometimes meet a strange creature in the form of a man bearing a pot of honey. He will ask the man to drink, and if the native does so, while the native is raising the pot to his mouth, the Golahoi, seizing him by the throat, strangles him. If a strange noise is heard coming from the depths of the woods the Wapokomo are generally very frightened, and will tell you this is the Golahoi calling.

The Wapokomo have also another series of ceremonies, about which they are very reticent. Certain of the headmen construct an instrument of the nature of a powerful drum, and this instrument is secretly taken away into the woods. They there stay for some time performing a vigil with this drum, and fasting the while. At certain intervals the drum is sounded, and when they hear this, the Wapokomo all retire to their huts, and dare not emerge until all is again quiet. It is very difficult to obtain a detailed and accurate account of these ceremonies without long residence among the people, as they at once become very suspicious if a European tries to investigate the subject.

Whilst speaking of these matters, I may mention a curious legend the Wapokomo possess relative to their origin. It is to the effect that in ages past a great giant, named Fumo Liongwe, lived at Kipini and possessed the whole country-side, particularly the Tana valley. One day in his wanderings he entered the Wanyika country, and carried off a man and woman of this tribe; this couple he took away to some place on the Lower Tana, established them there, and gave them orders to cultivate the banks, to build canoes, and row people up and down the river. This they did, and hence sprung the Wapokomo tribe. They live in dome-shaped thatched huts about 10 feet high and from 8 to 10 feet in diameter; these huts have a floor raised about 15 inches from the ground, made of a lattice of strips taken from the midrib of the leaves of the wild date. Lattice-work stages 6 feet in height are to be seen in most of the villages. When the floods are very high they retire to these stages, and live up there entirely until the floods subside.

The products of the Wapokomo are principally rice, bananas, and maize; there is very little rice grown above Subakini. In the Korokoro district rice is hardly grown at all; it is there a great rarity. Besides these products, a certain quantity of manioc, sweet potatoes, pumpkins, sugar-cane, tobacco, koonde, and chiroko or pojo, are grown; the two latter being a small variety of bean. A small grain called wimbi is also grown, for the purpose of manufacturing an intoxicating beverage. The Wapokomo also farm bees to a great extent. They take a piece of wood about 12 inches in diameter and 4 feet in length, and hollow this out till it is a mere shell, fill up each end with the exception of a small hole, and sling it up in a tree; this forms a hive for the wild bees. There are thousands of these hives to be seen as you proceed up the river. The natives do not eat much of it as honey, but use it principally for the manufacture of a fermented liquor. To ferment this it is necessary to obtain a rather peculiar kind of fruit; this fruit is about 1 foot long and 3 inches in diameter, composed of a hard fleshy substance; it is suspended by a single thin cord from the parent tree. This fruit is dried and cut up into pieces, and placed in the liquor required to be fermented. The best honey is quite colourless, and is equal in flavour to good English honey. The Wapokomo have no idea of the value of the beeswax, which is at present entirely wasted. The Tana tobacco is of good quality, and if skilfully dried it would be fit for the European market. At present the natives simply plait the leaves into a sort of rope and dry them in the sun. The Wapokomo possess a considerable amount of ivory, obtained second-hand from the Waboni.

The dress of the Wapokomo is very simple, consisting of a coloured cloth round the loins, and sometimes a piece of plain cloth thrown over the shoulders; they wear round the neck numerous thin chains of brass or iron; they also wear brass armlets. The hair is laboriously twisted up into innumerable little tufts with oil and ngeo—ngeo being red oxide of iron powdered. This mixture of raddle and oil is also smeared over the neck and shoulders; this process is only adopted by the young men who desire to attract admiration. The Wapokomo are armed with two spears, with small oval blades like Somali spears, one of which has a long shaft of 8 or 9 feet in length, this spear being solely used for spearing crocodiles and other objects in the water; some of the older men carry bows and arrows. The women are dressed in a sort of kilt from the waist to the knee very similar to that worn by the Wanyika; they also wear anklets, and belts embroidered with beads, and numerous bead necklaces. The women, like the men, are very expert in managing canoes. In many places, especially in the upper river, there are large groves of the *Borassus flabelliformis*. From the sap of this palm the Wapokomo make a sweet intoxicating drink. The estimated number of the Wapokomo is from ten to fifteen thousand.

Let us now briefly refer to the Gallas. The Tana Gallas are an example of a pastoral tribe, worsted in their struggles with their enemies, abandoning pastoral nomadic life and taking up quieter agricultural pursuits. They are a branch of the great Galla tribes situated in the south of Abyssinia, which in former times burst their bounds, spread south as a great wave of invasion, and eventually settled down and formed the three sub-tribes—Boran, Randili, and Barraretta Gallas. The Randili and Boran tribes still flourish, but the Barraretta tribe, which inhabits the Tana valley, was some twelve years ago almost crushed out of existence by an organized raid of the Ogaden Somalis, the Somalis having been paid by the coast Arabs and Swahilis. Since this blow they have never regained their lost power. Their principal settlements at the present day are at Kitumbini, near Kau, on the river Ozi; Borobini or Golbanti; a few scattered villages back from the river opposite Ngao, and a few others in the neighbourhood of Merifano. Above this exceedingly few are seen until the district of Korokoro is reached; in the Korokoro district they people a stretch of about 60 miles of river.

As the characteristics of this tribe have been already dealt with in the report of the expedition, *Proceedings* R.G.S., August, 1892, I will only give a few additional facts. The Gallas are monogamists, but they often possess Pokomo slaves as concubines. The men's dress is practically the same as that of the Wapokomo, but the women are usually dressed in tanned skins; their houses are the ordinary thatched domes. Besides their spears, they carry a small circular shield about 16 inches in diameter, usually made of giraffe hide, almost identical to those used by the Somalis. The male members of the tribe on their decease are buried close to the cattle-sheds; this is a relic of their old pastoral days, their love of cattle still being intense. The Korokoro Gallas will often travel away to near the mouth of the Tana to buy cattle, and should they survive the risks of the journey, the cattle are usually carried off by the Somalis before many months have elapsed. Many of the Gallas are capital hunters, and at the proper seasons they will go right out into the steppe land and camp at a couple of days' distance from the river, obtaining water by digging in the sand of a dry torrent-bed. They have at these camps a large breed of roughly trained dogs, which they use to bring an animal to bay, thus enabling the hunter to run in and spear it; they are very successful in obtaining giraffes by this method. They also set a kind of snare, by which they are very successful in catching big game. They bend down a bough of an over-hanging tree, to which they attach a tough rope made of aloe fibre; in this rope there is a noose, the bottom of this noose being pegged down to the ground. The site of this trap is usually fixed upon a well-worn game-track, such as is used by animals travelling to drink at the river. The largest animal I have seen caught by this method being the buffalo, will give a good idea of the strength of one of these snares. They also use to a less extent covered game-pits. When a man has killed an elephant, he is allowed to wear an ivory ring on his left arm; likewise, when a Galla has killed an enemy, he is allowed to do his hair into a little topknot. Unmarried women among the Gallas have their heads shaved into a tonsure, and upon marriage this tonsure is allowed to grow. The Gallas' food consists of flesh, curdled milk, and maize. They are not so drunken in their habits as the Wapokomo. The women are very clever at all sorts of plaiting work. Amongst other things, they turn out beautifully made vessels for holding milk; these are flask-shaped, and entirely constructed of plaited fibre, and yet are perfectly watertight.

There are two small tribes remaining to be mentioned, namely, the Waboni and the Wasania. These two tribes are practically one and the same people. The Waboni acknowledge the Gallas as their masters. They are entirely a nomadic tribe of hunters, very retiring in their habits, and seldom seen in the haunts of men; they are armed simply with bows and arrows; their dress is similar to the Gallas; they have no tradition of their origin.

The Wasania occupy a precisely similar position to the Waboni, and are practically indistinguishable from them, the only difference noticed between the individuals of these two tribes being that the Wasania are usually taller than the Waboni; but it is extremely difficult to pursue any systematic comparison of these two tribes without a long residence in their vicinity, leading as they do an almost solitary, wandering kind of existence. The Gallas told us that if a Msania wishes to marry, it is necessary for him to buy permission from the Galla chief, to whom he is subject, by means of a tusk of ivory; he then has to buy the woman of her parents with another tusk; a quantity of tobacco and honey are formally presented to the woman, who is then declared as his wife. One section of the Wasania tribe is said to be subject to the Somalis, who probably employ them as spies upon the Gallas, to obtain information as to good opportunities for raiding.

The Waboni, Gallas, and Wakamba, when out elephant-hunting, live largely upon the hard fruit of the *Hyphæne thebaica*, which palm abounds along the Tana banks and also fringes most of the dry torrent-beds which join the river. Some of the northern tribes utilize the kernel of the nut as cattle-food, but none of the East African tribes are aware of its utility, being unable to break the shell.

On proceeding upstream, and leaving behind all the Galla and Pokomo settlements, it is necessary to carry about twelve days' provisions in order to reach the next food-supply. Leaving the Company's station Balarti, a good day's march brings us to the southern edge of the flat steppe land which has bordered the river from its mouth. We then enter upon a new phase of scenery, that of the great area of metamorphic rocks, which occupy such a vast extent of country in East Africa. The river gradually rises in a series of steps formed by rapids or falls; every few miles great ridges of hard granitic gneiss cross the country at right angles to its general course, the river having carved its way through these obstructions, leaving perpendicular cliffs on either side, and furiously rushing along at the bottom with the aspect of a mountain torrent. A few small tributaries begin to appear; these streams are four in number, the first being the one called Salt river, so named from the fact that during the dry season, when it has dwindled to a narrow rivulet, it becomes rather brackish. It has a storm-bed nearly 100 yards in width, but usually covers a very small portion of this width, and for some miles along its course it is thickly fringed by groves of hyphæne palms. Two days beyond this is the tributary named Mackenzie river by Mr. Pigott; this is much larger and more constant in its flow than the former one, and has an average width of about 50 yards, and is about 3 feet 6 inches deep at average low water; this river is also fringed with groves of *Hyphæne thebaica*. Just above where this river joins the Tana, it comes dashing down a fine waterfall of nearly 50 feet, having carved a passage through a nearly vertical field of the hard hornblende schists which occur at this spot.

Near the entrance of this tributary the banks are very high and rocky, and progress is very difficult for caravans. The large veins of gneiss are very marked; they run due north and south, and on the opposite bank of the river their course may be traced by lines of cairn-like tors, which crop up at intervals along their course. It may be here remarked there seems to be a very close connection between the folding of these rocks and the occurrence of waterfalls and rapids. The strike of the rocks generally is north and south, while the course of the river is east and west, and in all places where the folding of the rocks becomes very severe and steep, either a fall or a stretch of rapids is formed. It may be that where this folding becomes so intense, shearing and over-thrust faulting may have taken place, and raised the general level of the country to the westward.

Along this stretch occur at intervals flat tracts of alluvial deposits; the river banks of hard metamorphic rocks appear to recede some distance from the river, their place being occupied by a flat plain covered with dense green vegetation. At one spot between Mackenzie and Salt rivers, there is a deep depression with a perpendicular drop of 50 or 60 feet, semicircular in shape, and about 2 miles in diameter; the whole area covered with the densest jungle. These phenomena are simply records of changes of the course of the river from time to time—the deep depression, for instance, being a beautiful example of alteration of course due to a cut-out; but some of the more extensive stretches are possibly raised beaches, formed at a period when the sea formed a vast estuary, stretching up nearly to the boundary of the Thaka country.

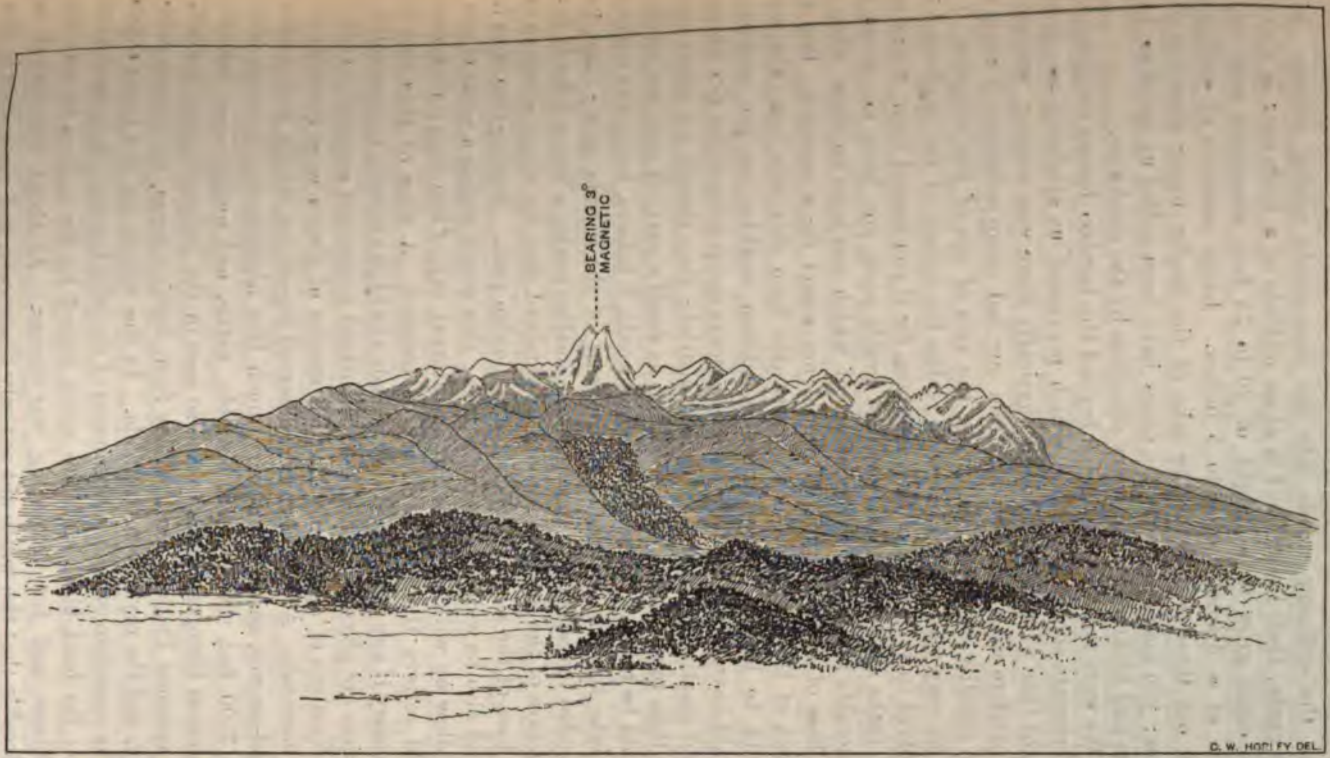
Beyond Mackenzie river are two other small tributaries. The first of these, like Mackenzie river, enters the Tana by means of falls; it is, however, much smaller than Mackenzie river. These last three tributaries all take their rise in a prominent range of mountains to the north, these being, I imagine, the mountains named by Peters the Kaiser Wilhelm Range, although wrongly placed by him in relation to the river; the native name is Janjai.

Near the last tributary is a ford in the river; this is the point at which the Swahili trading route crosses on its way from Ukambani to Mbe. The river is here cut up into numerous islands; most of its branches are fordable, but one on the south side is crossed by means of a rude bridge. This ford, I believe, corresponds with Krapf's crossing of the older maps. Two and a half days further on, following the north bank through the densest of thorn-bush, a large tributary is reached, and this tributary is the eastern boundary of the Wadthaka tribe. This tributary was (at the time of our visit) about 120 yards wide and about 3 feet 6 inches in depth at its junction with the Tana; at this point in the Tana itself are the largest falls seen during the expedition. The river divides itself into several streams, and falls sheer over a cliff of about 60 feet in depth. Viewed from the opposite bank, the upper course of the river is not seen at all, but the water seems to spurt out from a perpendicular cliff, which is crowned with a tangle of Raphia palms and other vegetation. A coast trader who has travelled through this district many times, tells me that the tributary comes from east of Kenya, from a lake called Kilikoka; this may correspond with the lake Abayila of Ravenstein's map. At the time I was in hopes that the discovery of this tributary would solve the question of the destination of the waters of the Guaso Nyiro, but have recently heard that subsequent explorations of Lieut. von Höhnel have proved the Guaso Nyiro to enter Lorian swamp as originally supposed; no mention is made of an outlet from the east side of Lorian in the direction of the Juba river or elsewhere. Crossing this tributary, we at once enter the cultivated country of the Wadthaka. About 3 or 4 miles back from the river run a chain of mountains, and on the slopes of these the Wadthaka villages are situated. The river here rapidly bends to the south, and after about two days' march in a south-westerly direction we arrive at another large tributary, which forms the southern and westerly boundary of the Wadthaka. This tributary is about 90 yards wide at its embouchure, and about 3 feet 6 inches deep. The current was very strong, the rapidity being due to a fall of about 20 feet in the stream some 300 yards above our ford.

The dimensions given to these rivers may be taken at a fair average, as we passed through this country in October, being some little time after the great rains had ceased, and before the small ones had commenced. Overlooking this tributary to the north-east is a peculiarly shaped ridge, the outline of its summit being as flat as if artificially levelled. As we climbed this its structure became self-evident. The face of the slope was strewn with a talus of basaltic lava, while the ordinary grey schists peeped through *in situ* at intervals. The last 40 feet or so of height consisted of a lava cap which probably covered a large area of plain in former times, but is now denuded down to a mere ridge. As evidence of its original greater extent, I may note the existence of a recent conglomerate composed of volcanic rocks of the same character which occurs some miles from this spot on the opposite side of the river; the ridge was very narrow at the point crossed by us, but widens near the river; there was no evidence to show whether it formed part of an enormous lava flow from Kenya, or whether it is due to a fissure eruption contemporaneous with the volcanic activity of that mountain. Another day's march along the river, through thick mimosa thorns or woods, brings us to another tributary, and to the confines of the territory of the Wambe. This tributary also proceeds from Kenya.

Mbe is a thickly populated fertile area, lying as a rule somewhat back from the river. Near this spot the river was left, and a route taken across country in a due westerly direction. Rounding the slopes of a flat-topped mountain, called Albert Mountain by Krapf, one passes through a rolling plateau surrounded by an amphitheatre of mountains. The main route for Kikuyu passes over a dip in a mountain range to the west, and from the summit of the pass, looking west, a glorious panorama of Kikuyu is unfolded to the gaze, stretching away in a vast plain intersected by innumerable watercourses all running south to join the Tana, whilst to the north the enormous outline of Kenya is just visible through the shrouding masses of cloud. Descending the western slopes of this range, numerous plantations are passed through, and in about an hour and a half's marching the boundary of Wambe is crossed. Curiously enough, this boundary coincides with the junction-line between the volcanic rocks of the Kenya area and the great metamorphic series to the east; the actual boundary-line is on the west side of a well-marked valley, in which is a small stream overgrown with sedges. Beyond this stream one enters a splendid park-like, gently rolling country, thickly studded with small trees, undergrowth being rare; numerous game abounds, as there is plenty of water in most of the valleys. A march of about 9 miles through this sort of country brings one to another rapid flowing stream of about 50 yards wide and 3 feet deep, which runs south to join the Tana; crossing this, in a short march one arrives at the boundary of the Kikuyu plantations.

Kikuyu might be described as the land of wild flowers and sweet-smelling grasses. One marches through a wonderful variety all day long, and growing as they do in kind of hedgerows between the paths and plantations, it reminds one forcibly of English lanes; there is, however, very little waste land, as almost every acre is cultivated and occupied. Near all the villages are open patches of close short turf, with clover just like English grass; and if not for the banana groves, one might imagine one's self in Kent or Surrey, for the vikwa (large potato-like tubers of the yam family) are trained up on poles just like hops. As the lower slopes were gradually ascended, large patches of bracken and fern were seen on the hillsides, quantities of mignonette, a kind of dandelion and other wild flowers, many very like the English species. The villages of the Wakikuyu are never found above an altitude of 6000 feet. Beyond the last plantations, large areas of bracken fern 6 to 7 feet in height are seen; intertwining with this, common English bramble is found, and ripe blackberries can be gathered. Passing the bracken, one enters forest; and a more tangled mass of virgin forest it is impossible to imagine. Large numbers of the trees were of gigantic dimensions, being 6 and 7 feet in diameter at man's height from the ground, and rising up to a height of about 150 feet some of them are a variety of juniper. The trunks of these big tree are one hanging mass of ferns and lichens, these plants and mosses als forming a carpet under the trees. In the ravines are clumps of tree-ferns which mingle with the other trees, and a view from the top o one of these ravines presents a scene of marvellous beauty. These ravines are often more than 300 feet in depth, with sides as steep as 45 degrees. One day's march took us through this forest, after which we reached continuous woods of bamboo cane. We followed an elephant track, but even then progress was very slow owing to the overhanging canes which impeded the track. These bamboo-cane forests on Kenya are worthy of note; they are, I believe, peculiar to the Kenya region, the area called Mianzini in Masailand, and one or two localities on



VIEW OF MOUNT KENYA FROM CAMP IN NORTH-EAST KIKUYU.

Mau escarpment. The lower limit of growth is very sharp, the chan from the ordinary woods into the cane-woods taking place withi 100 yards; their lower limit is at an altitude of a little over 7000 fee The canes grow to a height of 20 to 25 feet, sometimes more, an often at a diameter of 4 to 5 inches. Large numbers of elephant seek out these woods for the sake of the tender upper shoots of th canes; you may see where the canes have been pulled up quite by th roots and broken down in every direction by the elephants.

We were not able to proceed beyond the bamboo forests owing to a unfortunate shortness of food, which prevented us attaining a greate height than 8700 feet, although physically there was nothing whateve to interfere with our advance; from our last camp a distinct track wa seen steadily ascending, following the axis of one of the ridges. It i not an easy matter from below to realize the extent of the undertakin involved in the ascent of the mountain, for if you ascend from the sout and make a direct line to, say, the double peak, you have to cross innumerable ravines, of the existence of which you have no idea when a the base of the mountain. I would not assert for a moment that th ascent of the mountain is impracticable from this side, but the wor would be heavy. Any future expedition working on the mountai should have the bulk of the men in a secure camp some miles to the ea of our starting-point in a good food district; they should not start wit less than ten or eleven days' food, and as small a party of men as possibl should be taken. These precautions would, I believe, bring an explorer up into the smaller peaks to the east of the double *spitz*; then, by extended investigation amongst the smaller peaks, a better idea of the structure of the mountain would be obtained than by single route up to the base of the almost perpendicular double peak. During the climb it would also be well to blaze one's track; this would enable a relay of men to follow up with more food, at an interval, say, of five days; these men could relieve the original body of carriers. A plan of this kind is necessary if any lengthened stay is made at a high altitude, because native carriers are physically unable to withstand protracted exposure to cold.

Numbers of apparently English species of plants were observed on the mountain. At 8500 feet were observed dog-violet, thistle, dock, nettle, forget-me-not, and a plant very much like nightshade; between 6000 and 7000 feet the begonia, bramble, nettle, and oxalis were noticed; numerous European ferns were also seen in the juniper forests, bracken, the common English fern, parsley fern, hart's-tongue, blechnum, polypody, and the royal fern Osmunda. In the valleys on the lower slopes of the mountain occasional specimens of the wild banana (***Musa ensete***) are seen; the hard black seeds are much prized by the natives for making necklaces and for decorating war-dresses. At about 6000 feet it is noticeable that the white ant entirely disappears, and gives place to the earth-worm.

Kikuyu is sometimes visited by numbers of locusts, which at times do considerable damage to the crops, but, as far as I could find out, they never appear in dense swarms as they do in the northern parts of Africa; they are fried and eaten with great relish by the inhabitants.

We will now give a little attention to the tribes whose habitat lies between Hameye and Kenya. To commence with the Kikuyu people. As these people have been often referred to elsewhere, I will confine myself to noting only a few details. In most tribes the women do the whole of the cultivation, but the Kikuyu men work in their fields quite as much as the women. Where the main trade route from the coast to Uganda passes through Kikuyu, the natives are famed for their pugnacity and treachery, but south of Kenya, where they have little or no communication with the coast natives, they do not seem to have developed these hostile characteristics; for during our visit to the mountain we left the bulk of our goods in a camp among the Kikuyu villages, simply in charge of the Swahili headman and quite a small body of porters, and the natives made not the slightest attempt to molest our men or carry off any of our goods. They, however, show very great dexterity at petty thieving. In the daytime they would come and sell to a porter a bundle of tobacco, and at night, the porter, knowing their thievish habits, would put it under his head for a pillow, and in spite of this precaution it would nearly always disappear during the night; in fact, their own headmen would tell us that if we saw any of his people prowling about at night, we might know they were thieves and were at liberty to shoot them. The food of Kikuyu consists of bananas, maize, mtama, or millet, sweet potatoes, vikwa or yams, koonde, a kind of haricot bean, maweli and kimanga, which are small kinds of grain—the latter being, I believe, similar to the massango of the Zambesi basin, which is a variety of *penicillaria*. The majority of the bananas are used in a green state, but a few are allowed to ripen as fruit, and are large and of a delicate flavour. Red pepper is also grown to a small extent, and the castor-oil plant. There is also a succulent vegetable called mayugwa; it has a large heart-shaped leaf, and grows to a height of about 3 feet; when the leaf is cooked it eats like spinach. The root is also edible; it is, however, necessary to soak it in water before cooking, to take away its strong pungent property, which otherwise would render it very unpalatable. The plant is a variety of *colocassia*. Tobacco is largely grown in Kikuyu for smoking and snuff-taking; the plant here is larger than I have seen elsewhere, probably from the fact that Wakikuyu manure it with cow-dung; they are the only tribe in the interior that I have seen who appreciate the value of manures in agriculture. The Wakikuyu possess numbers of cattle, sheep, and goats, principally the latter. They are in daily terror of the Masai raiding parties, which were very frequent about the time of our visit, because the anthrax scourge was killing off nearly all the cattle in Masailand, and they were raiding to increase their stock. One old Kikuyu native came two days' journey to obtain from us magic medicine to stop the Masai raids, to prevent his cattle dying, and also to bring on the rains. The hill-slopes in Kikuyu are, in my opinion, most admirably adapted for growing English wheat; the rich red volcanic soil, the frequent showers, and the sun too, of nothing like tropical heat, would, I believe, suit corn to perfection; in fact, barley has been already tried and grown with success at the Company's fort in Western Kikuyu.

During our stay in this district we saw some individuals of the mysterious tribe Waruguru, as was described in the *Proceedings*, August, 1892. When we were on the mountain we looked out in vain for traces of the habitations of these people, but at a considerable height among the bamboo forests we saw elephant traps, which had been set by members of this tribe. These traps consisted of a heavy log of wood about 4 feet in length, in the base of which was fixed a large poisoned dart; this log is slung up into one of the large trees to a branch overhanging an elephant track; near the point of suspension a trigger catch is devised; from this catch a cord is carried down the trunk of the tree and across the path. An elephant coming along the path runs into the cord, the catch is released, the log falls, and the poisoned dart strikes the elephant in the region of the spine; if not killed immediately from the shock, he soon dies from the effect of the poison. I have since met an Arab trader who has also seen these Waruguru people, and he confirmed all that I had previously heard and seen of them, and he told me that they do not cultivate, but simply live on game they kill, and hunt elephants for ivory. With regard to their origin, the only suggestion I can make is that they are an isolated offshoot of the Suk tribe, which inhabits a district to the south-west of the Lake Rudolf, and who are characterized by their hirsute appearance.

We next came to the Wa-Mbe, a quiet, peaceable, agricultural tribe, who occupy only a limited area on the north bank. This tribe suffers a great deal from the scourge of Masai raiding-parties. I have often heard people recommend the despatch of a strong punitive expedition against the Masai. This, I think, would not likely be of much avail; with their great knowledge of the country and rapid movements, they would easily evade any large force that might be sent out against them; for in East Africa we have not the advantage of mounted troops as in the south. Moreover, the task of crushing the Masai is one hardly worth attempting, for they are not by any means a united tribe, governed by one individual; thus an attack on one section does not mean that the other clans of the Masai would come out and take the field against one. I, however, submit that the best policy is, by occupying the surrounding countries and assisting the people raided upon to hold their own, thus to confine the Masai to the proper limits, and curtail the area available for raiding; in time, under these conditions, they might prove most useful allies to the administration.

Adjoining Mbe on the left bank of the river comes the Wadthaka country. As this tribe has already been described in a previous communication, I will not deal with it at great length. We may here remark that Peters' name of Wadsagga for this tribe is not at all correct, and his explanation, showing their relation to the Wachagga of Kilimanjaro is, I think, entirely without support. The derivation is simply this. The word "Thaka" is Kikamba for "wilderness," and they call themselves Wadthaka, "Wa" being simply the Bantu prefix for "people." This word Wadthaka, very softly pronounced, might easily be mistaken for Wadsagga. They are industrious cultivators, producing more than they are able to consume. They grow millet, maweli, chiroko koonde, sweet potatoes, manioc, castor-oil plant, and a few bananas; also pumpkins, and excellent tobacco. They are very keen traders. The Wadthaka men all carry small iron tweezers, with which they carefully pull out their eyebrows and eyelashes. They have also adopted the peculiar method of partial circumcision similar to that customary among the Masai. They carry rather peculiar throwing clubs. These clubs have light wooden shafts, but heads of stone, covered with skin. The Wadthaka smelt iron to a small extent for their axes and spears, the ore used being a decomposition product of some of the schists, which contain a considerable quantity of iron locked up in the more basic mineral constituents. Some time in the near future an outpost in this country may be of considerable use to the administration, for Machakos station in Ukumbani can be reached in ten or eleven days from here, and the station near Hameye in about the same time. It would thus complete the chain of communication between Machakos and Hameye, and if ideas are ever entertained of tapping the great ivory districts east and north of Kenya, this would prove an excellent starting-point for subsidiary caravans working these regions.

Between the Wadthaka country and Hameye on the south side of the river, opposite the tributary called the Salt river, are found a certain number of kraals belonging to Wanderobbo, but very little is seen of the inhabitants. The older members of the community and the women are constantly roaming about, seeking change of pasture for their flocks, while the younger members are nearly always absent elephant-hunting. The Wanderobbo are nominally serfs of the Masai, like the El-Konono; the former being hunters, and the latter being iron-workers and makers of tools and arms. These Wanderobbo on the Tana are, however, so far removed from the Masai that I doubt whether their serfdom is more than nominal; it may be that amongst these tribes of hereditary serfs, the Wanderobbo, El-Konono, Waboni, Wasania, and Walungulo, we may be able to discover the survivors of the original inhabitants of the country in far distant times before the Bantu wave came from the south, the Masai wave swept down from the region of the Nile valley, and the Gallas from southern Abyssinia.

The Wanderobbo often cross over to the north side of the river for hunting, but they leave their kraals, flocks, and herds on the south side; they were heavily raided by Peters, and when we passed they turned out *en masse*, informing us that the last white man who passed (Peters) had carried off their cattle and goats, consequently they did not wish to hold any communication with us; whereat we passed on our way.

We may here remark that there is one domestic process amongst all these tribes which unconsciously acts as an index of the kind of country the tribe inhabits; I refer to the processes used in the manufacture of flour. The Wapokomo, Gallas, Wanyika, and Wadigo break up their corn by means of a pestle and mortar, the mortar being a hollowed-out log of wood shaped like the dice-boxes of a backgammon board, and the pestle being a pole of hard wood; but the Wadthaka, Wamba, Wakikuyu, and Wakamba all grind their corn, using a slightly hollowed-out slab of hard rock, in which a smaller piece is rubbed along. This is a never-failing index of the structure of the country; for in the lower Tana valley, where there are nothing but alluvial sands and gravels, the natives are unable to obtain rock to make their handmills, but in the metamorphic region further west suitable slabs of gneiss or hard schist are everywhere at hand.

I shall now give a few details of the country between Hameye and Machakos. Opposite Balarti station the river is hemmed in by a thick belt of forest, which runs uninterruptedly for some distance either way. The forest belt is about 7 miles thick, and this area being flooded at high river, the growth is of the densest character. When we crossed over from the station to proceed to Ukambani, it took us about 5½ hours to cut our way through this into the open steppe-land beyond. We then marched along parallel with the edge of the forest, expecting to find a break through which we might gain access to the river. No break could be found, and after being about 24 hours without water, both the natives and their leaders began to show great signs of exhaustion; fortunately, however, after a few hours' more suspense, a little water was obtained by digging in the sand of a dry stream-bed, and this it was that undoubtedly saved the lives of a good many of the men, as the sufferings of some of them were already rather severe. We followed the upward course of the river on its south bank until opposite the Salt river, when fortunately, having found a good Mkamba guide who had come across to the Tana, elephant-hunting, we struck across a flat dry plain in a south-westerly direction, with the object of reaching Ngomeni. At this time, about the middle of November, one could not fail to be reminded of the fact that spring was near at hand, for within a week or so all the thorn trees burst out into full leaf, nearly every bush having its flowers, the whole air being laden with the sweet scent of the blossoms, especially those of the mimosa camel-thorn. About 22 hours' hard marching through a trackless, waterless extent of thorn-bush brought us within sight of the mountains of Ukambani, in the vicinity of Ngomeni, and about another hour and a half's marching brought us to a bare rock, near Ngomeni, around which the Wakamba had dug deep pits, these pits receiving the drainage of the rainfall which fell on the bare non-absorbent gneiss. This was the first occurrence of permanent water since leaving the river. A march of a few miles then brought us to the foot of Ngomeni. Ngomeni is a fine, castellated-shaped rock rising precipitously to a height of about 500 feet from the plain. It is a fine example of a mass of mica-schist thrown up into an irregular anticlinal, the axis of which is about north and south; it exhibits in places very complex minor folding. The population immediately around Ngomeni is very dense, villages clustering all round the base of the rock, and up the rock where it is not too steep. In the vicinity of every village the ground was strewn with hundreds of skeletons of oxen which had died from disease a short time previously. In many places they had piled up the carcases as a wall round the villages, being unable to transport such numbers to a distance; the air was laden with the unwholesome effluvia. Out of all the enormous herds in the Ngomeni district, only some twenty or thirty beasts had survived.

Leaving Ngomeni, and proceeding nearly south-south-west, we touched the mountains of the Kitui district, which is very fine from a scenic point of view, and every hour's marching brought into view new features of the mountain ranges which surrounded us on all sides. A great deal of the country is covered with thick woods, mainly composed of a green-barked sponge-wood tree, but the Wakamba are gradually extending the area under cultivation, clearing away thick woods in a most patient and persevering manner. The Kitui mountains divide themselves into two ranges, running north and south, at a distance of some 8 miles, and between them is a wide fertile valley down which runs the small river the Nzio. The soil of the valley is deep alluvial, and formerly was nearly all cultivated by the Wakamba; but since some extensive raiding by the Masai a few years back, it has been entirely deserted, with the exception of small patches near the hills. Leaving this valley, we crossed the western range of the Kitui mountains, and, proceeding south-west for a day and a half, marched through a region having an altitude of about 5000 feet, at intervals obtaining glimpses of the snow-peaks of Kenya, which, from this point of observation, must have been quite 80 miles distant. Leaving these high lands, we began gradually to descend into the wide stretch of plain-land which contains the Athi valley. For about two days we marched through a park-like region with fine grass and thin mimosa scrub; but as we proceeded westward the trees became fewer, and at last disappeared, and stretches of miles of open grass-land were visible from the tops of the ridges, with hardly a tree to be seen. Before reaching the river Athi we arrived at the base of a steep cliff some 200 feet in height, and ascending this found ourselves upon a plateau about 2 miles in width, and running indefinitely north-west and south-east; this proved to be one of those peculiar larva-caps similar to that seen to the north of the Tana, near Mbe. On the western side, this plateau ends abruptly in a steep cliff about 400 feet in height, and about a quarter of a mile from its base runs the river Athi. The river here is about 50 yards wide and 4 feet deep. Crossing to the western side and proceeding about south-west by west, a day's further march through a fine open rolling park-land, thickly wooded and covered with good turf, brought us to the edge of the Wakamba settlements of Western Ukambani. Another day's march through a closely cultivated fertile country in about a westerly direction brought us to the Iveti mountains, and rounding the spur which forms the southern end of the range, we arrived at the Company's fort of Machakos, on the main trade route to Uganda.

The Wakamba of Eastern Ukambani differ very little from those of the western division of the country; but before the cattle disease they kept far greater herds of cattle than their neighbours in the west. As the land rises from Ngomeni till one reaches the highlands of Kitui, the prevailing crops naturally vary according to the altitude; for instance, in the Ngomeni district the principal product being millet, and in the fertile valleys of the Kitui highlands, around the base of the Chandula mountains the prevailing crop is manioc. They also grow a certain amount of maize, koonde, and the usual various small grains; sugar-cane is largely grown, principally for chewing and making a beverage, and in the valley of the river Nzio they grow it in circular pits 3 or 4 feet deep. There is not enough moisture in the ordinary soil, but by digging these pits the plant gets the moisture which filters through the subsoil. The Wakamba are a very friendly people, keen in trade, intelligent and energetic; and this tribe is, I feel sure, destined to play a great part in the future history of the country as a source of labour. They have for a long period been in communication with the coast; large bands of them periodically setting out for Mombasa, carrying ivory or driving herds of cattle and flocks of sheep and goats for barter with the Swahilis, the meat supply of Mombasa being almost entirely dependent on the Wakamba. They are the most musical tribe I have yet seen, their favourite instrument being a pipe, which sounds exactly similar to the chanter of the bag-pipes. You hear the sound of these pipes continually as you march through their country. They are played by the young men when out tending their flocks.

I will now briefly speak of the fauna of the districts already described, commencing with the Tana basin. Upon entering the river, the first animals that attract one's attention are the baboons, which are nearly always seen on the sea-beach about this point. They belong to the genus Cynocephalus, and often attain a height of 4 feet 6 inches.

In the early reaches of the river, numerous crocodiles also abound; but above this, from Charra up to Kidori, they do not occur in large numbers, this being the most thickly populated stretch of the river, and the Wapokomo thinking the crocodile meat a great delicacy, they are unsparingly hunted. In the forest stretch, between Kidori and Korokoro, they are numerous; but it is in the uninhabited stretch, between Korokoro and the Wadthaka country, they occur in the greatest numbers and attain the greatest size. At low water the sand-shoals are seen to be tenanted by swarms of these creatures, lying there basking in the warmth of the sun's rays. At the time of high river very few are visible. Two kinds were observed—one, the ordinary greyish, muddy-coloured variety; the other, of a pale greenish tinge, the latter being much rarer than the former.

The fish of the Tana are extremely numerous, but very poor in species. Most noticeable is a large fish of the Siluroid kind, which often attains a large size, as much as 45 lbs. in weight. It is, I think, similar to what is known as the cat-fish at the Cape. The skin is devoid of scales and rather slimy, the head is flat, and the mouth of enormous width. The upper part of the head is hard and bony; from the lower lip there are pendant strings of skin. They are very unpalatable and strong-flavoured. This fish is the staple food of the crocodile.

There is another fish, not unlike the common dace, which is very good eating. It has scales of a greyish silvery colour, and is of very slim proportions; it is seldom found over 3 lbs. in weight. There are also small kinds of minnow-like fish in great numbers. On one or two occasions I have seen in the Tana a black water-snake. This was never above 2 feet in length; it is said by natives to be very poisonous.

Among the larger mammalia are the elephant, hippo, rhino, buffalo, giraffe, zebra, and the various kinds of antelope. Then come the carnivores, such as the lion, leopard, hyæna, etc. The elephant has an extremely wide but a very uncertain range; he is often seen near the coast in the game country behind Golbanti, but when his tracks are noticed, the native hunters are out immediately, and the elephant at once retires to more unapproachable districts. The only parts in which you can always rely upon finding elephants are the steppes which border the upper river on both banks above Masa. At Korokoro they are fairly numerous, and although the Gallas are always hunting them, they will at night come down and destroy the maize plantations, and by dawn they are miles away in the bush. Above Korokoro they are constantly hunted by Wanderobbo and the Wakamba, and cannot be said to be very numerous. Westward through Ukambani the presence of a population precludes the occurrence of this timid animal.

Near the mouth of the river a considerable number of hippos are found, but, like the crocodile, owing to the presence of the inhabitants, are very seldom seen above Charra, and thence we do not find them again until past Korokoro; but beyond this point they are found in great numbers. The largest number ever seen together was at a point beyond the Mumoni range. There are here a large number of small tree-clad islands, and at the foot of one of these, protected by the island from the force of the current, lay a herd of about twenty-five hippos, with their heads above water, resting on each other's backs.

The rhinoceros is not found in the lower river; in fact, its occasional occurrence may be said to commence about Ndera. Above Ndera it is sometimes seen, but never in great numbers; it attains its greatest frequency of occurrence in the open plains east of the river Athi.

The buffalo is first seen in the swampy flat country between the Bellazoni Canal and the coast, and in similar country at the back of Golbanti; thence onwards it occurs, but rather rarely until we reach the last villages up the river. Beyond this it becomes fairly common, but the ravages of the disease of the latter half of 1891 decimated their numbers, and this species must have run a great risk of becoming extinct; during our march to Kenya we saw the carcases of several thousand buffaloes in all stages of disease and death.

The giraffe and zebra were first observed at Merifano, near Ngao, and are then found at intervals along the whole course of the river, the giraffe becoming very common beyond Korokoro. Both these animals are gregarious, but large herds are seldom seen along the river. Large herds of zebra, numbering more than fifty, were seen in the Athi plains. They are invariably striped down to the heels. They are *Equus Burchelli*, var. *Chapmani.*

The antelopes and gazelles observed in this area were the tope, *Alcephalus Senegalensis;* Coke's hartebeest, *Alcephalus Cokei;* the water-buck, *Kobus ellipsyprimna;* the mpala, *Melampus mpala;* the oryx, *Oryx beisa;* the wildebeest, *Connochætes gnu;* lesser koodoo, *Strepsiceros imberbis; Gazella Walleri, Gazella Grantii, Gazella Thomsonii,* and various other species similar to the steinbuck and duiker, also *Neotragus Kirkii.* With regard to the distribution of these species, those of the Tana valley are tope, water-buck, oryx, Coke's hartebeest, lesser koodoo, mpala, *G. Walleri, G. Grantii, G. Thomsonii,* and *N. Kirkii.* The tope, or Senegal hartebeest, was first observed at Merifano, and after this at intervals on both banks up to near Korokoro; after this not a single specimen was seen, although I have heard they reappear near the Sūk country. The water-buck is very common throughout the whole length of the river; the oryx was not seen until Korokoro was reached, and even then it was rare. Coke's hartebeest is not found in the whole of the lower and middle river, its first occurrence being on the north bank in the stretch of park-land lying between Mbe and Kikuyu. The lesser koodoo is not very common, but occasional herds are seen on the upper river. The mpala was not seen in the lower river, but around Korokoro it is common, and the specimens obtained were larger than those seen in any other part of the territory. The *G. Walleri* occurs in the lower river; it attains its greatest frequency in the region of Korokoro, especially on the north bank of the river; about half-way between Korokoro and the Wadthaka country it disappears. *G. Grantii* is found in the lower river, but was not observed north of Merifano. *G. Thomsonii* was observed in the Korokoro district on the north bank of the river. *N. Kirkii* occurs in great numbers throughout the whole length of the river; there are, I believe, two varieties of this species,—those in the rocky districts of the upper river have long hairy crests, in those of the lower river this crest is hardly visible.

The new antelope, *Damalis Hunteri*, was not met with during the whole expedition. In the large open plains between Eastern and Western Ukambani, the wealth of game is very great, the principal antelopes in this plain being Coke's hartebeest, Wildebeest, *Gazella Grantii*, and *Gazella Thomsonii*. Near the Athi the water-buck is abundant.

There are two representatives of the hog tribe found in this area; the wart-hog, *Phacochœrus Æthiopicus*, is the commoner, and is observed at intervals over the whole of the district, both in the bush country and in the open plains. The other kind, the reddish-brown bush pig, *Sus larvatus*, was only observed in one place—on the left bank of the river at Gubaida; it inhabits the thickest bush. There is one small kind of hare found in this area; it is never very common; it has a greyish mottled-brown colour, dirty white underneath, probably *Lepus saxatalis*.

Lions and leopards are found throughout the whole of this tract, but cannot be said to be common or troublesome at any point. Of the smaller cats the *serval* was observed. Hyænas are very common; only the spotted variety was seen. The civet cat was occasionally observed on the north bank of the river near Korokoro. There is a small jackal found in the Korokoro district, probably *Canis lateralis*; it is always solitary in its habits. Between the Tana and Ukambani the wild hunting-dog was met with; it was of a blackish colour, with white on its tail and feet, possibly *Canis simensis* (?); it is often found in packs of thirty or forty. The presence of porcupines may be often inferred from the occurrence of loose quills, the porcupines themselves being very seldom seen. This remark also applies to the scaly ant-bear, *Orycteropus* sp. (?); its burrows are continually seen among the bush, but I myself have never seen a live specimen, the nearest approach being a skin in the possession of a native.

Among the smaller quadrupeds may be mentioned the tree-hyrax, which is found among the big forests of Mount Kenya. When camped upon the mountain the forest at night used to re-echo with the human-like shrieks and calls of this creature, hidden on the tops of the huge trees,—it had a most weird and uncanny effect. I did not see the animal, but from the natives' description it is probably *Hyrax Brucei.* The small mongoose is found in the dry steppe-land. Myriads of small monkeys also tenant the bush bordering the river in many places,—they belong probably to the genus *Cercopithecus;* and many large specimens of the varanous lizards, often miscalled iguana, but really the *Monitor niloticus*, are seen. Snakes were not common. A thin, small, green, harmless variety was sometimes observed, and specimens of the deadly puff-adder were occasionally met with. On the Athi escarpment a snake about 10 feet in length, very thin, of greyish colour, was seen; it was of a much lighter colour than the python. It showed fight, but was fortunately killed before doing any harm.

Of the birds, the ostrich, *Struthio danaoides*, was first observed at Merifano, and occasionally after that in the lower river, not being met with at all in the upper river; it was, however, seen in great numbers on the Athi plain.

The greater bustard, *Otis kori*, may be next mentioned. This magnificent bird was only seen in two places—once in some open ground in the Western Wadthaka country, on the south side of the Tana, and again in some old deserted plantations near Ngomeni; at the latter place a specimen was obtained which weighed about 50 lbs. The flesh on the breast of a bustard is quite equal to that of a turkey.

The spurwing goose, *Plectropterus gambensis*, was seen in the upper river, but never in great numbers. It is always found in pairs. A small black duck was also found in limited numbers along the river. In some of the reaches of the river above Kidori, enormous numbers of pelicans, cranes, storks, and ibis were seen. At some distance beyond Korokoro their occurrence almost ceases. Two varieties of guinea-fowl are found—the crested and the vulturine, together with various kinds of partridge, grouse, and francolin. Among the birds of prey observed might be mentioned the buzzard, vulture, and marabou stork. The first is everywhere, but the vulture and stork do not appear till some distance from the coast. There are two species of vulture—the greater and smaller. The marabou stork, *Leptoptilus crumeniferus*, was not seen at all until Korokoro was reached, and even then was not found in great numbers. A large brown mottled-plumaged owl was seen near Hameye.

The study of the structure of the country from the Tana valley westwards, that vast area covered by such a medley of metamorphic rocks of all kinds, is very instructive; but to understand the problem properly one has to look further afield, and to commence with the broader aspect of the question. Thanks to the researches of Heim in Switzerland and Professor Lapworth in England, it may now be said to be a well-demonstrated fact that the shape of all the continents and oceans, and the relative areas of land and water, are determined by the axial direction and length of the great earth-folds which traverse the surface of the globe.

Africa is no exception to this law, and there is the general central arch, with corresponding low-lying plains on either side. Taking the region of the equator, this central arch is marked on one side by the elevation of Kenya and Kilamanjaro, and on the other by the great masses of Ruwenzori, Gordon Bennett, and Mfumbiro; but being of such great width, it has sagged in the middle, forming lines of depression—the great depression upon the line of Rudolf, Baringo, Naivasha, and Natron Lake; the great trough of the Victoria Nyanza, and then again the depression marked by the Albert Nyanza, Semliki Valley, and Muta Nzige. These are the features generalized, but locally the phenomena are complicated greatly by tangential pressures at right angles to these folds, and thus it is that the main folds often become themselves twisted and folded, giving rise to the occurrence of the granitic domes so notable in great metamorphic areas, similar to that described in this paper lying to the east of Kenya. The most perfect examples of these domes are two hills on the south side of the Tana, near Hargazo; they stand out 300 feet above the plain, are of bright pink gneiss, bare of all vegetation, and very regular in outline. There are numerous other examples of the same structure in this region, and near the coast.

Between this dome structure on the one hand, which is the result of the most complex series of forces, and the regular mountain chain running in a meridional direction, which is the simplest form of earth-crumpling, we may find all degrees of transitional and intermediate forms, the one type passing into the other without any break, and as examples of these intermediate forms we may mention the precipitous masses of Ngomeni and Kisigau. And even in the most perfect truly folded mountain chains, like some of those in Kitui, we see the upper outlines of the range rising and falling in a series of peaks, these rises and falls being the resultant of comparatively weak waves of force at right angles to the main wave-motion which has elevated the mountain mass.

WANDERINGS IN THE HINTERLAND OF SIERRA LEONE.

By T. J. ALLDRIDGE.*

I do not propose dwelling upon the many remote parts of the colony I have visited, but simply upon those hitherto unknown localities at the back of the Sherbro or south-eastern district of Sierra Leone, to which may be given the general name of Mendi-land, although it includes several other countries; and which, on behalf of the Colonial

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[*] Map, p. 192.

Government, I have had the honour, during the last four years, to explore and open up. Mendi-land, therefore, is the subject of this paper.

To reach these newly explored districts of Mendi-land we will start from Sulima, on the sea coast at the mouth of the Sulima river, 200 miles south of Freetown, but only 6 miles from the Liberian frontier, the Mano river. It is important to remember the nearness of Sulima to Liberia.

It had been felt for some time that the internecine wars of the interior, which were of constant recurrence, greatly hindered the prosperity of the colony of Sierra Leone, and, of course, seriously affected the revenue. It was therefore resolved, during the very able administration of Sir J. Shaw Hay, K.C.M.G. (1888–91), now Governor of Barbadoes, to adopt a firm and greatly extended policy for the interior. The first steps taken were the appointment of travelling commissioners and the establishment of a frontier police force. The commissioners and the frontier police have now been at work between three and four years, and the transformation that has taken place in the districts affected is little less than marvellous.

On the southern side of the colony alone some 200 miles of a country, most of which was absolutely unknown to us, has been explored and brought within the sphere of British influence. This large tract of land is no longer devastated by marauding bands; main roads have been cleared and kept open entirely by the native chiefs themselves; and whereas but a short time ago it was unsafe for any one to travel through the country unarmed, to-day a child might go with perfect safety over a great portion of the roads. All these wonderful changes in the new districts have been brought about without war, without bloodshed, without coercion of any kind, by a series of friendly treaties with the paramount chiefs. In these treaties the chiefs have promised to cease from carrying on any more wars within the sphere of British influence; have undertaken to keep open the main roads through their respective territories; and to allow British subjects to trade within their dominions.

In my official capacity as travelling commissioner I had the honour of receiving the instructions of the Government to open up this particular tract of country, Upper Mendi-land, and to endeavour to arrange these numerous treaties. I am very happy to say that in both cases these instructions have been carried out to the satisfaction of the Government.

Having thus briefly stated the causes that led to my entering the Hinterland, I will now try to describe my journeys and what I found in the countries I passed through; although it will be impossible, within the limits of one paper, to give anything more than a very rapid sketch.

The start was made from Sulima. I had already been more than once as far as Bandasuma, about 40 miles up the Sulima river; but I had absolutely no knowledge either as to the country or the people I should meet beyond that point. The Sulima river, which is quite half a mile wide at the mouth, is only navigable for the first 20 miles, as far as the Falls of Wedaro, halfway to Bandasuma. The Sulima is the only large river I met with, and therefore deserves special notice. Wherever I came upon it, it was always wide. At the furthest point I saw it myself, which was at Songo in Luawa, about 180 miles from the sea, it was certainly not less than 80 yards in width; and it formed there the boundary between two large countries, Upper Gese and Luawa. A ferry-canoe was plying between the opposite shores. Upon getting into Bande, a considerable distance to the east of Luawa, I was informed that the Sulima not only ran through that country, but was to be seen seven days' walk beyond, at a place called Fenele, in the Kawmendi country. How much further it runs no one knew. In the upper regions this river goes by the name of Moi-a. Beyond the Falls of Wedaro the bed of the Sulima consists of large boulders, over which during the rains the stream rushes with a torrent-like impetuosity, coming down evidently from the mountainous regions far inland.

If modern science could render this great waterway available for transport, the produce of the upper regions, which is to-day entirely wasted, could be at once turned to account for commercial purposes, and the greatest natural barrier to the development of the country and its peoples removed.

The Sulima traverses a pre-eminently oil-palm country. The oil palm grows all round Sulima on the coast, and at the furthest point I reached it was still flourishing luxuriantly. It is, in fact, mainly from these lands that the exports from the colony of Sierra Leone of palm oil and palm kernels are obtained; but I imagine that the quantity exported is as nothing to the enormous mass that is untouched, simply from want of the means of transport. Some idea of the present difficulties of carriage may be formed when it is known that it takes at least thirty men to carry down a ton of palm kernels. Of course, by this method it is only possible to get down small quantities, and these from a very limited distance. It should also be borne in mind that the tribal wars provided an employment for the people and a source of revenue for the chiefs. These wars having now happily ceased, it becomes necessary that both chiefs and people should be given, if possible, the means of turning their natural wealth to account; this can only be done by, in some way, facilitating transport.

I would here venture to remind those who are interested in the development of the resource of the colony of Sierra Leone, and who desire to see a railway made to some remote northern locality, believing such a scheme feasible and profitable, that nearly all the heavy and awkwardly handled produce, such as palm kernels and palm oil, which are now exported to England and the Continent in very great quantities, come down from the south and not the north side of Sierra Leone. The north is not to any great extent a palm-tree country, the products of the northern rivers being chiefly rubber, gum, gold, hides, and rice; while as for the south side, it would be impossible for me to exaggerate the number of oil palms I have seen on my different tours.

During the first part of the journey I now propose to review, the country was monotonous, and its features of the kind well known to all African travellers. The land was fairly level, and travelling good on the main road until the Gaura country was reached, about 100 miles from the coast, although here and there we met with low hills. The direct route in the lower districts lay through the Gallinas, Barre, Tunkia, Gaura, Jave, Mando, and Bambara countries to Luawa. From this direct route there were cross-roads to Koya, Dama, and Malema that I had to take in order to negotiate treaties with the chiefs of these places; after which I returned to the main route into the interior.

I have gone over the greater part of this lower route four times. The first time was when I went to endeavour to make the treaties. I then found no road at all except country tracks—consequently travelling was beset with all sorts of difficulties; but as by degrees the treaties were made, each chief at once set about cleaning and widening his roads, and when I returned I found first-rate roads, admirably kept. I should add that African roads require constant attention. The soil is so wonderfully fertile that the best-cleaned road, if left untouched for three months, would be overrun with a tangle of weeds and low vegetation.

Beyond this lower route, which I have just mentioned, lay what I will call the upper route, extending from Luawa, through the Bombare, Tunke, Vassa, Gese, and Bande countries on to Pandeme, in Bunde. The countries along the lower route may be grouped together as Mendi-land, and Mendi is the language universally spoken. But on arriving at the borders of Luawa we begin to meet with a great diversity of tongues, such as Gese, Bande, Kono, and others, together with Arab-speaking Mohammedans, who are often accompanied by Mendi interpreters; these, although they do not understand Arabic, can translate the Mandingo or Susu the Mohammedans generally use into the Mendi language. The traveller's linguistic difficulties, it will be readily conceived, are many and great as soon as he passes Luawa, where the Mendi language becomes less generally available; and after a time, when the Bande country is reached, ceases altogether.

The main road is cut through bush so dense that you can see nothing of its surroundings, except when, in mounting a hill, you chance to come upon an opening. This monotony is, however, now and then relieved by the sight of a fairyland of inconceivable beauty, of which some travellers have already written, but whose very existence others, who have not been so fortunate as to see it for themselves, have called in question. I was among the fortunate ones, and saw it very frequently.

This fairyland consists of an avenue of palmettos, ranging in height from quite low trees up to, say, 30 feet, each tree and intervening shrub being entirely enveloped in masses of a delicate fern, which is closely allied to our favourite, the maiden-hair. It would be quite impossible for me to describe the charm that surrounds these dainty works of nature. Even my own native boys, usually quite indifferent to natural beauty, were amazed at this profusion of loveliness. Unfortunately, the most beautiful vegetation is generally associated with a swamp or a quagmire. This is particularly true of the exquisite white lilies I have frequently seen on the silent pools of the African forest, with hundreds of their blossoms standing on stems 3 feet out of the water. No one but myself cared for these blossoms, but my boys found out that I valued them, and always plucked one fine head and stuck it in front of my hammock.

As to population, when I first went over the lower route, immediately after the conclusion of a serious native war, I found the country had been entirely devastated, and was almost without towns or people. On my various journeys, since that time, I have been struck by the rapid increase of the population, at the many new towns that have sprung up and the number of partially demolished towns that have been reconstructed. There is now an elaborate network of towns, and of hamlets called Fakais, all over the country. The country is so thoroughly well watered that there is no difficulty in choosing a site near a running stream.

An ordinary town on the main road is really a clearing among the big vegetation, which forms its natural walls. The huts were formerly clustered together in so irregular a fashion that they formed a maze not to be penetrated by a stranger without a guide, and so closely packed that the thatched eaves of one hut overlapped those of its neighbour. The reason for this style of building is to be found in its security against slave-raids and war-parties, as the people of the town could easily escape into the dense bush immediately surrounding them as soon as an alarm was given, before their enemies could have time to track them through these labyrinthine burrows. This rabbit-hole arrangement had, however, its weak point, for in case of fire everything before the wind had to go. Since the country has come under British influence, and neither slave-raids nor war-parties are to be feared, the new towns are being built on a more open plan. Following my advice, they are now building their huts much further apart; the towns consequently not only look very much better, but can be kept much cleaner, and the main road can be carried right through them, which used not to be the case. Some of these new towns are really beautifully clean, admirably kept, and very picturesque in appearance. The huts vary greatly in size, and are of the description common to most parts of Africa, with mud walls and roof of palm thatch, and are either beehive or parallelogram in form.

In the lower countries near the coast, when beds are met with they are of palm cane; in the upper countries the bed is a fixture, and is merely a solid block of dried mud, about 1 foot in height and 6 feet in length. As I have had a large experience of both, I may say that I infinitely prefer the mud bed, which can always be brushed down easily, and is consequently far cleaner than the cane palm bed; besides which, there is no place for snakes and other vermin to harbour under it.

In passing through some of these towns, it has often been a great pleasure to me to receive the spontaneous expressions of thanks towards the Government, for initiating that new Interior Policy which has put an end to tribal wars within the sphere of British influence; enabling the people to settle down to their native industries and the cultivation of the land, in the enjoyment of a security to their lives and property they have never known before.

As we advanced inland, the towns became much larger and the population denser. On getting as far up as the Mando, Bambara, and Luawa countries, it seems to be the custom, at the great centres, to build three large circular towns within a few yards of each other, each containing some hundreds of huts, and each encircled by several war-fences. There is generally a large cleared space in front of these towns, which is called the Korbangai, and is used for public gatherings. On these Korbangais I have sometimes held political meetings, when there have been as many as a thousand people, chiefs and their followers, present.

The war-fences that protect the towns are rough stockades. The stakes are formed of live trees, generally thorny acacias, the lower part of the stake being kept free from foliage, while the top is allowed to sprout. These stakes are thickly interlaced with a rude lattice of long live canes, which also sprout, so that there is soon a pretty dense mass of vegetation at the top of the fence, which is, as a rule, about from 15 to 20 feet high. The gate of the war-fence is, without exception, a solid slab of hard wood, cut from the spur of a large tree, and so strong that it can never be broken in native warfare.

As a matter of fact, in native warfare they never attempt to force a gate—they would need artillery for that; it is always the stockade that is attacked. If the head war-people, or Krubas, who are all fetish men, can succeed in surmounting the first war-fence, they can then remove the heavy post which fastens the gate at the back, and open the gate to their followers, if they are not killed before they can do so; for it is by no means certain that if they get over one war-fence they will be able to get over another.

Around these towns a certain amount of cultivation is carried on, and there are to be seen farms producing rice, casada, sweet potatoes, and other articles of local consumption; and there is the palm tree everywhere, and everywhere evidence of extreme fertility; but beyond these things, there is little in the lower part of the route to call for special remark. When, however, we get about ninety or a hundred miles inland, and arrive at the Gaura country, the land becomes mountainous and far less familiar to us.

The delights of mountaineering in the tropics can only be fully appreciated by those who have enjoyed them. There is no path or track of any kind; your only chance is to scramble up the dry bed of what in the rains is a torrent, a rugged cutting down the mountain-side, 3 or 4 feet deep and blocked with boulders. To get up this watercourse is a very difficult and exhausting operation. I frequently arrived at a town on the summit of one of these hills so utterly exhausted that I was quite unable to move for several hours.

These mountains, which were covered with forests, were invariably of quartz; but further on, in the Bandi country, many of the mountains were of a dark grey granite and almost entirely without vegetation, the escarpment being generally very steep and quite without any hold such as a European foot could take. My native boys, however, thought nothing of these steep hillsides, and went over them like so many wild goats; but as to myself, I could only get down by placing one of these sure-footed creatures in front of me and grasping the back of his coat for support. On these granite heights there was frequently a plateau, where, exposed to the full glare of the sun, the rock became so fiercely hot that it was impossible to tread upon it, and we were obliged to wait until the sun had left it awhile before we could proceed.

One of the loftiest of these granite mountains that I went over was the Bakka Vassa, in Bande, from the plateau on whose summit I obtained the finest view I have ever had of that country. From Bakka Vassa Bande appeared to be nothing but a mass of irregular hills, covered with a low, dense vegetation with a high mountainous background; towns being dotted about, both on the hill-tops and in the valleys as far as the eye could see.

In the Bombare country, about 180 miles inland, I suddenly came upon a high mountain known as the Mamba—an isolated peak, which, standing out in bold relief against the surrounding country, naturally produces a very awe-inspiring effect that makes it an object of terror to the people, who believe it to be the dwelling-place of a devil. I went somewhat out of my way on purpose to attempt the ascent of Mamba, but on arriving at a small fakai at the foot of the mountain I found that nothing would induce the people to cut a track for me through the dense bush, nor could I get any information out of them except that a very bad devil lived there. They would not even accept the present that I hoped would procure me a little bit of the rock; and they seemed uncommonly glad when I turned to depart without having aroused the anger of the local evil spirit. Beyond Mamba there was a range of mountains known as the Kate, stretching a considerable distance from east to west.

Upon arriving at Dambaru, near to Bande Wuru, in Tunke, we found it a very pretty town, situated on a hill, and offering a distinct contrast to any town we had met before, as the huts were made of a dull red earth very different in colour to the ordinary country whitewashed walls.

The up-country markets interested me very greatly, so I will now devote a little time to describing one of them, and I think I shall be able to show that the up-country people are not at all in the wretched condition often pictured by the European imagination; on the contrary, they have little difficulty in obtaining most of the necessaries that their simple mode of living demands, besides many other things that to them are luxuries. I have not heard of these country markets in localities that can be supplied from the coast, the nearest being at Bai-wara, beyond Mando, about 150 miles inland. The first up-country market I saw myself was at Popalahun, in Vassa. I saw another, a day's march beyond, at Kabbawana, about 3 miles from the capital town of Bande, Kolahun.

These markets, which are of weekly recurrence, are always held in the open, under large trees. The last mentioned was held under a gigantic banyan, and there must have been close upon a thousand people present. It was not known by the people that I was going to attend this market, and their surprise upon seeing a white man suddenly burst upon them for the first time can be more readily imagined than described. The brisk trade, of which I had just caught a glimpse, immediately ceased, and I became the object of universal attention. Crowds followed me about as I tried to make my way through the people and among the wares that were spread all over the ground. But, in spite of these impediments, I managed to collect a list of the articles offered for barter, from which I think it will be seen that these Hinterland folks are practically independent of coast supplies. The only important articles I noticed were gunpowder and salt, and these but in small quantities, both being very precious.

Here is my list of the articles offered for barter:—Cotton in the raw state; country cloths, made up; cloth in long lengths, about 5 inches wide, as from the loom; spun cotton thread wound on spindles; blue dyed ditto in skeins; indigo leaves, dried, for dyeing; tobacco leaves, dried; palm nuts, palm oil, palm-nut oil; country-made iron; clean rice, rough rice, ground nuts, cus-cus, Guinea corn; bananas, pumpkins, jakatu (a kind of bitter tomato); boiled sweet potatoes, dried okra; cassada; fowls; dried flying ants; dried rats, on skewers; dried fish; good country mats; native pottery, chiefly bowls, in large quantities; a few cattle, sheep, and goats; and a small quantity of salt and gunpowder.

The chief currency was iron in long strips, in shape like a T square, one strip of which I considered equivalent to a penny; and imported salt, which was much valued; but everything passed in barter. In the bush I met several native ladies, who were going to market with their purses under their arms, in the shape of a mat containing perhaps a couple of dozen of iron strips. I may here mention that throughout the whole of my journey I came upon iron-stone, but never saw anything like smelting. I was told that these strips of iron were brought down from the Kormendi country, where the iron was smelted.

Although there was a great din of voices in the market, there was no disorder of any kind, in spite of there being people of many different tribes present, many of whom had walked in from considerable distances. This good order I attribute entirely to the absence of intoxicating liquors of any kind.

I found a large amount of intelligence among the up-country people. When debating the conditions of a treaty, their questions often showed that they thoroughly understood the nature of the obligations they were about to take upon themselves; and that this was the case I am perfectly satisfied, as they have frequently reminded me of those obligations, and have told me what they had promised to do and what they had not promised to do.

Bande was the furthest point at which a treaty was made.

On leaving Kolahun in Bande to reach the town of Pandeme in Bunde, the most notorious war-town in the whole upper country, we went through about as bad a bit of travelling as one could well encounter. The country throughout was very hilly, much of it being of that bare granite description already mentioned, with ranges of forest-covered mountains in all directions. In this 20 mile march we had to fight our way through a general combination of all the impediments we had hitherto met, and all our difficulties were greatly increased. The network of entangled creepers and vines swooping down from the tall trees in the primæval forest gave us a great deal of trouble. The country was thoroughly wild, with bad swamps, confused morasses, and jungles of palms and tall reeds, which completely enveloped my men with their loads, and me in my hammock. At other times there were dense low shrubberies, many streams, deep valleys covered with a medley of all and every kind of vegetation, from bushy shrub up to gigantic forest trees. The only beautiful sight I came upon in the whole of this district was the Mawir water, a stream about 30 feet in width, which swirled madly round huge boulders through the gloom of a tall, virgin forest; the darkness and chilliness of which same forest, and its deathlike stillness, unbroken save for the rushing of the Mawir, produced a weird effect altogether indescribable. From this dark forest, which it took us over two hours to go through, we emerged quite suddenly, and, without the slightest warning, found ourselves in an open country of what had once been rice farms, but were now overgrown wildernesses.

After this, although there were mountains all about, the remaining road was fairly level until we reached the war-town Pandeme, at the foot of a lofty range. I found the people of Pandeme quite different from any I had ever met before. They are entirely a war-people. They know nothing but warring; they live by warring, and will fight for any one who will pay them well for their services. To enter their town of Pandeme it was necessary to pass through a narrow lane of war-fences, about 60 yards in length, but divided into ten distinct sections, any one of which might be closed and those within entrapped. The superstition of the Pandeme people was, if possible, greater than anything of the kind we had hitherto come across, and although my Bande guide and interpreter was himself a chief, he had to "eat country fetish" before he was allowed to approach the town. I was evidently looked upon as an uncanny person, for some of the Pandeme chief's war-boys had reported that they had seen me talking to the sun. They had, in fact, come upon me in a bit of old rice plantation, working an observation and using my sextant. It was, therefore, thought that I was bringing some very bad "medicine" to the town.

When I ultimately got into Pandeme it was several hours before the chief could make up his mind to approach me, although he sent repeated messages to say that he was coming. When at last he put in an appearance, surrounded by many of his head people and war-boys in the quadrangle of the town, I could not prevail upon him to sit by me, or upon anything I provided; but one of his people, who carried a quaintly shaped stool, placed it opposite to me at a respectful distance, and on this the chief sat. After a short talk he presented me with a white country cloth, to show his heart was "clean" towards me, together with a black fowl and some kola nuts, all emblems of friendship.

This war-town of Pandeme is, as I have just said, the capital of Bunde, and the furthest point of my journey. The Bunde people were not so interesting to me as the Mendis. They seemed altogether a wild lot, and evidently knew nothing of white people. They were not at all disposed to fraternize with my escort of frontier police and my boys; all of whom, although black, were as great strangers to them as I was myself, for not one of them could speak a word of the Bunde language: in fact, as regards language, we were all at the mercy of our Bande guide and interpreter.

The Sofa tribe, to whom these Bundes belong, are much feared in the neighbourhood, as they are exceptionally well furnished with guns, and fight in the daytime; whereas the people of the lower countries always fight just about dawn, and never during the day. Right away from the coast up to this point there are no horses to be found anywhere; but here, at Pandeme, I saw horses of a small, wiry breed. These are much used by the leaders in time of war, which naturally gives the Sofas a great advantage. I noticed here a very striking difference in the tattooing of the people. In the lower districts there had been a white or coloured dressing on the face; but up in Bunde all the markings were in a jet black, produced by a mixture of two vegetable dyes found in the neighbourhood. These jet black markings on their dark brown faces produced a peculiarly barbaric effect.

Occasionally there might be seen a child wearing a few beads; but beyond these beads, and the guns and powder the war-boys carried, no imported article was to be found in Pandeme. All cloth was of country manufacture. On my offering to exchange some American leaf tobacco for fowls, the people looked at it, sniffed at it, and asked what it was. It was evidently unknown to them, although native tobacco in extensive patches was in cultivation outside the town. We had met, *en route*, as usual, rubber vines in the forest, also Calabar beans, and, even at this distance from the coast, we found the oil palms still numerous and flourishing.

With Pandeme the limits of my tour were reached. After remaining for a few days in the town, we began our return journey, and were fortunate enough to discover a good road, which saved us from again traversing the abominably bad one by which we had come; and although this road was more mountainous than the last, and the travelling consequently very exhausting, it was preferable to the swamps and jungles we had had to pass through before.

Having thus rapidly sketched in my tour, I will now devote a little time to the consideration of the customs and ceremonies of the Hinterland people, dwelling chiefly on those of the inhabitants of the upper countries who have not been under the influence of imported spirits.

The "Poro" and the "Bundu" are organizations of the first importance, and are well known throughout the entire country. They have been described by previous travellers, and correspond to similar institutions all over Africa. A few details here may not be out of place.

The Poro is a system of Freemasonry amongst the men and boys, the Bundu being also a secret institution amongst the women and girls. The dress is very peculiar. A hoop encircles the waist, from which depends a cascade of fibre reaching to the ankles. A netting of country cotton is over the body; a curious head-dress, not unlike the front of a mitre, and of fantastic device, is usually worn, and some *sebbehs*, or fetish charms, hang from the neck. The dancing is performed to the beating of the *sangboi*, or tomtom. Dancing and singing to this accompaniment are the principal amusements of the Mendis after dark, and very often they are kept up for the entire night. When the boys have completed their training and ceremonies in the Poro, they are eligible to attend Poro meetings; and all assemblies and consultations of chiefs upon secret country matters, whether of war, peace, or what not, first take place in a Poro bush.

Every large town where there is an important chief has its political

Poro bush, which is as sacred, except to the Poro people, as is a lodge of Freemasonry.

The places where the children are trained are always selected in some secluded spot in the big bush, which they clear sufficiently to suit their requirements; after which wigwams of palm leaves and wattles are erected, which is quickly done, as everything is of the most primitive description. These retreats are then always spoken of as the Poro bush and the Bundu bush. The approach to a Poro bush is readily distinguishable by the Poro emblem, which is conspicuously put about the public bush-paths. This emblem is called Kané, and is a small kind of pretty mossy fern, which is twined round shrubs and the trunks of trees.

As to the Bundu girls' whereabouts, no indication is given, and it is enshrouded in secrecy and mystery. Now and then, however, there reverberates through the forest a weird sound, which, once heard, can never be forgotten. It is one long-drawn low note, which presently grows louder and then gradually dies away. This unvarying chant, or rather wail, peculiar to the Bundu girls, alone betrays the neighbourhood of their encampment. These young Bundu girls are under the entire control of some of the elderly women of the town to which the Bundu is affiliated; and the country laws in connection with the Bundu are so exceedingly severe, that for any man to attempt to penetrate within its sacred precincts would probably mean death to him, or, at all events, the selling of him into slavery. It is in the Bundu that the girls are initiated into certain secret country customs appertaining to their sex. While there, all Bundu girls wear round their waists several ropes of bugle beads, made from a very thin cane, and upon their high coiffure is usually a cluster of circular seeds, resembling a bunch of large black grapes, both the beads and the seeds having a fetish signification, and, except on special occasions, this may be said to form their entire costume. Any persons having the means can send their girls to this Bundu, or, as it is in reality, convent. It not infrequently happens that a child of nine or ten years of age is betrothed before entering the Bundu, and is kept there at the expense of her *fiancé* until she is at a marriageable age, when, amidst great rejoicings in the town, with firing of guns, and killing of sheep, goats, and cattle, the girl is removed from the Bundu and presented to her husband.

Previous to this she is greased all over until she has assumed a high polish, and she is adorned with as many silver ornaments, of the most heterogeneous description, as can be borrowed for the occasion from the friends of the family. She is loaded with long silver chains, to which are attached large silver plaques, containing some Mori fetish charm, long silver armlets, silver bangles, anything and everything in the way of country-made silver-work—all very massive and rough, but all must be of silver; and, as may be supposed, the contrast of so much brightened silver against the polished ebony body is very striking, and, although very barbaric, the effect is uncommonly good. The betrothal consists of an arrangement with the child's parents for the barter of the girl, which is fixed at £3, that may be paid in kind.

Amongst many other accomplishments which the girls are taught in the Bundu is dancing. The dancing costume consists of a netting of country cotton worn over the body, long bushy branches of palm-leaf fibre suspended from the thickly plaited bangles of the same fibre round the arms and wrists, various *sebbehs* or *gree-gree* charms hanging from the neck, and short knickerbockers of country cloth tied above the knees by palm-leaf string, to which are fastened small pieces of hollow iron, with little rings loosely hanging from them, which, as the dancing goes on, jingle not unpleasantly, for native iron gives out a somewhat rich sound. The chief feature in the get-up is, however, the "dressing" of the girls' faces; which means that these faces are covered with strange devices, produced by the smearing on with the finger of a substance called *wojeh*, composed of white clay and animal fat. The coiffure is a high and most elaborately plaited superstructure, worked in small patterns—a very favourite design, closely resembling that curious concretion known to geologists as the brain-stone—and embellished by a silver *gree-gree*, or by the "medicine" bunch of seeds I have mentioned before.

The girls dance to the music of the *sehgurah*—a small gourd with a longish neck, covered loosely by a netting of hard seeds strung upon country thread, which is shaken by the women—and also to the *sangboi* or tomtom of the men. The girls not only dance together in a miniature ballet, but execute very excellent *pas seuls* in the most creditable and pretty manner; and after an unusually well-performed and difficult dance, some of the elderly ladies present will rush excitedly into the arena, embrace the successful dancer, and at once commence to besmear her face, neck, and shoulders with a liberal supply of grease, amidst the frantic yells and gesticulations of delight from the admiring onlookers, many of whom manage to find some trifle to present to the dancers after the performance is over. At the conclusion of the entertainment the girls are escorted back to their place of concealment, the whole affair being conducted in the most orderly and decorous fashion.

The Bundu devil is a "medicine" woman, who is believed to be capable of casting spells, for good or evil, over the destinies of the men. There is generally a Bundu devil in any large town belonging to an important chief, but she does not appear in her peculiar costume unless she is especially called out to look into some misbehaviour on the part of the men, or upon some gala occasion, or upon the visit of strangers whom it is wished to honour. I had myself many opportunities of observing this remarkable personage, who naturally inspires her people with much awe, and commands the greatest respect from all classes.

Her distinctive costume is unvarying, all Bundu devils being similarly attired, except as regards the head-piece, which admits of some slight difference. No part of the body may be visible, consequently the cloth casings of the arms and legs are sewn up at the extremities. In each covered hand the "devil" carries a little bunch of twigs, with which she goes through a sort of dumb-show, as she never does any talking. Her dress is of long shaggy fibre, dyed black, and over her head she wears a grotesque wooden mask. Occasionally she indulges in a dance, but owing to the great heat produced by dancing in so heavy a dress, a little goes a long way, and after a few moments she retires to some quiet part of the town, where her attendant, who is always present with a large country mat, unrolls it, and encircles the "devil," who is then able to remove her mask and obtain a little fresh air away from the gaze of the madding crowd. I have had the honour of shaking the covered hand of a good many of these devils. I was also fortunate enough to obtain possession of a very fine specimen of a Bundu devil mask, which is now to be seen in the Ethnological Section of the British Museum. The fetish power of these beings is very great.

There is, near to Gola, a tribe known as the Beli people, who are cannibals of the worst order. I happened to meet a fine-looking old Beli chief with some of his people at the town of Gahun, in Mando, where he was a refugee. Being struck with his unusually well-cut features and his venerable grey beard, and noticing that he and his people were strangers in the town, I inquired of the local chief who and what he was. Whereupon he was brought up and introduced to me. Finding he was a Beli chief, I asked him if it was true, as was reputed throughout the country, that his tribe were cannibals. He at once became very communicative, and without the slightest hesitation, and evidently proud of the fact, he told me that there was no person in Beli, over three years of age, who had not eaten human flesh. In talking of slaves, he stated that they rarely had any trouble with them in their country, as when they ran away and were re-caught, they were killed and eaten; knowing what was in store for them, it was not often they did run away. In justice to the Mendis, I must say that they have the greatest abhorrence to any such customs.

As soon as the African traveller gets away from European settlements and recognized Christian influence, he becomes aware of the existence of the Mohammedan Mori man. In Freetown, Mohammedanism is a highly respectable institution, having its mosque and schools, and its adherents form no inconsiderable part of the native community. For instance, that exceptionally fine race, the Mandingos, are all followers of the Prophet. The itinerating magician, known as the Mori man, can, I presume, hardly be considered as a missionary by the faithful. I have met him everywhere, but never seen him teaching anything to any of the Mendi people. With them he is merely a fetish medicine man. He is, however, a great power, and the recognized soothsayer everywhere. Most of the large chiefs have one or two of these Mori men in their towns, whom they continually consult, nothing of any importance being undertaken without their counsel. These Mori men certainly make more money than any one else in the country, as they do nothing without being handsomely paid for it. They are the sole purveyors of the written fetishes. Some of the wealthier families, who are able to afford this luxury, will have innumerable strips of paper, where it can be obtained, or bits of cotton-tree wood, covered with magical hieroglyphics, hanging from the palm rafters of their huts. Everybody wears some sort of fetish or *saraka*, and of course everybody has to pay for it.

Some time ago, when a great many chiefs were travelling down with me to Bandasuma to meet his Excellency, Sir Francis Fleming, K.C.M.G., the Governor, the great *saraka* of one of them, carried by his head wife, was a pair of country-made iron tongs, something like snuffers, about 3 feet in length. These tongs had been previously charmed by the Mori magician, and the chief, although an unusually intelligent man, believed that his life depended upon those tongs—that, in fact, his life was somehow bound up in them.

Besides the Mori men, there are many native "medicine" men, who provide country fetish, although of a ruder description. Although fetish is universal, I am of opinion that several of the great chiefs have little or no belief in the mystic powers of any of the medicine men; in fact, some of them have laughed at them with me, and have told me that they only employed them to satisfy their own people. To my mind the Upper Mendi country presents a grand field for missionary work. At present it is absolutely unbroken ground, no white man but myself having been there. The people generally are of such a cheerful and kindly disposition, they seem so much interested in the smallest thing shown to them, they are so communicative, have so much good sound sense, and are so ready to listen and to learn, that there seems every prospect of success for a well-organized mission.

I have already alluded to the Korbangai, or cleared space generally to be found outside any up-country town of any importance. Surrounded by the dense vegetation, out of which the site of the town has been cut, with groups of dusky natives sitting about, enjoying the shelter of the tall trees that have been purposely left standing, among the stone-edged graves of those who have passed away—the Korbangai is always extremely picturesque. It is on these Korbangais that the great meetings of chiefs from all parts of the country are convened. As I have said earlier, I have held political meetings on some of these Korbangais, where the chiefs and their followers have numbered a thousand. When the meetings are expected to last for several days, it is usual to erect long open sheds with thatched roofs, in which are slung the hammocks of the more important chiefs. During the debates, which often last for days, these chiefs recline in their hammocks, each one surrounded by his wives; his attendants forming groups outside under the trees. When I held meetings, as soon as I had formally opened the proceedings I would ask each chief to appoint a speaker, when, unless he wished to speak himself, which it was not usual for him to do in an early stage of the meeting, he would designate his prime minister, who was sure to be thoroughly well posted up in the affairs of his country. These upper-country people are born orators, and a chief never puts forward a man who is not a good and fluent speaker.

One at a time, an orator steps into the centre of the Korbangai, and walking to and fro, with measured pace, he opens out the subject with the caution of a practised barrister. During his speech he will frequently appeal to his people as to the truth of any particular assertion, when they will instantly reply as with one voice. Should a question arise, and the orator demand of the other side whether such and such a thing is so or not, no reply is given until the chief and his head people have retired from the Korbangai to consult together. When they have arrived at a decision they return, and very quietly the answer is given, with deliberate caution and great dignity. The whole debate, in fact, is carried on with the greatest ceremony and decorum. The politeness, especially in the opening remarks, addressed to the various chiefs, whether friendly or otherwise, is exceedingly noticeable, and often filled me with profound amazement and afforded me infinite pleasure. At these times it was difficult for me to realize that I was in a so-called uncivilized country, for certainly the manners of these native "parliamentary hands" were polished to a very remarkable degree. It struck me forcibly that many a lesson might be gathered from the dignity, the courtesy, and general friendliness which these tribes showed not only towards a stranger, but in their everyday life towards each other.

I shall always look back with extreme pleasure on the many kindnesses I have received at their hands. I consider them a great and able people, with, if properly handled, a great future before them.

The principal industry throughout the entire Mendi country is the weaving of cotton into cloth. The texture of this cloth is very durable, and the colours, being all vegetable dyes, retain their brightness, however often washed. This cloth is made upon a primitive native loom in long strips only a few inches in width; of these strips are formed the country cloths and gowns. The Gallinas in Lower Mendi undoubtedly take the first honours in the artistic treatment of colours, and in the production of a diversity of patterns. The up-country people appear to know only blue and white, or black and white, and no designs beyond stripes. I am sure, if these cloths were known in

England, they would be much appreciated and used, especially for *portières* and other hangings; but hitherto they have been treated only as curios. This is a native industry, which, if encouraged in England, would give employment to thousands of people.

The up-country chiefs and people, used as they are to a cloth that will really wear, somewhat despise such cheap and gaudy specimens of English cloth as they chanced to see in the hands of my carriers, and they have said to me that they were quite able to buy and pay for good cloth, if they could get it. These Upper Mendis, if dealt with commercially at all, should be treated honestly, and deceived neither with regard to quantity nor quality. That is to say, a twelve-yard piece of cloth should measure twelve yards, and not be folded for the express purpose of disguising its length. It would be very short-sighted policy to do business with these shrewd people on any other lines.

The weaving of country cotton is entirely the work of the men, the women's part ceasing with the ginning and spinning. Pottery-making is the great industry of the women, and very clever they are at it. With only a lump of clay from the bank of a neighbouring stream, a board, and a couple of palm-cane modelling sticks, in a few minutes a woman will turn out for you a large and well-formed bowl.

Clay-pipe making I have not met with nearer than 150 miles from the coast. The making of mats and of nets for fishing, or for trapping game, ironwork, and—by the Mohammedans—leather-work, this with agricultural labour, including the culture of rice, cassada, ground nuts, cus-cus, maize, sweet potatoes, bananas, tobacco, indigo, pumpkins, okra, sugar-cane, and cotton, will complete the list, when I have again mentioned the all-important making of palm oil, and the cracking of palm nuts. I have been into towns where you could scarcely find a path among the stretches of palm nuts that were spread out on the ground to be sunned before boiling for expressing the oil.

Next to the palm, the tree of most value commercially is the Camwood tree. This tree obtains very considerable dimensions; I have seen several from 50 to 60 feet high. I mention this fact, as there has been much uncertainty as to the size of the Camwood tree. The centre or heart-wood is of a fine orange-red colour, which darkens on exposure, and is used for dyeing. It has hitherto only been exported in small billets, owing, I presume, to its great weight and the difficulty of transport; beyond this I know of no reason why large baulks of it should not be shipped.

A word as to the climate of the interior. When inland, I have found the climate apparently much healthier than either in Sherbro or Sierra Leone, and while away from the coast it has been quite exceptional for my carriers, escort, or myself to suffer from fever or other climatic troubles, although I have been liable to get a slight fever on my return to the coast. In all my travels, some 4000 miles overland in We Africa, I have never carried a mosquito-net, or any bed beyond a cor mattress. I have never drunk the country's water without having boiled and made into weak tea, which I have found an excellent stimulant to travel upon, and I have always tried as much as possible to liv upon such food as could be obtained in the country, such as fowls, eggs, rice, and cassada.

In conclusion, I should like to remark, that although in the course of this sketch I have spoken of the districts I have gone over as extremely fertile, I have purposely avoided alluding to any speculative results that might accrue in the distant future from the cultivation of crops, such as coffee and cocoa, requiring special knowledge and attention, as well as time to mature. I have been anxious only to bring forward that enormous wealth of indigenous product that requires no cultivation, but which is now lost to British commerce through our inability to transport it to the trading centres. I observe that Mr. Scott Elliot, in his recent official Report upon the botany of Sierra Leone, states that, in the northern route he followed with the Boundary Commission, "both forests and probably rubber are being rapidly exhausted." He further says that it is very probable that every vine is destroyed in extracting the milk. If this is the case in the northern rivers, it becomes all the more imperative that very special attention should be given to the south or Sherbro side of Sierra Leone, and its resources developed to the utmost. For years past, long before this Hinterland of which I have been speaking was opened up, the Sherbro, even with its restricted commerce, was known as "the milch cow" of the colony.

Since the adoption of the new Interior Policy of Sir J. S. Hay, which is being continued and extended by the present Governor, Sir Francis Fleming, a satisfactory increase has taken place in the revenue of the Sherbro district, as well as in that of the whole colony. What, then, might we not expect were adequate facilities available to the natives for bringing down their products from those upper parts, where to-day this great store of natural wealth, increasing year by year, is simply wasted? Modern science, which can do so much, may be able to devise some means of communication, say for 100 miles inland, by which these ready and willing people of our Sherbro Hinterland might be brought into touch with civilization; while at the same time it would afford an opening for a very much larger output than at present for our Manchester and other markets, which in its turn would very materially increase the general prosperity of the colony of Sierra Leone.

THE JACKSON-HARMSWORTH POLAR EXPEDITION.*

By F. G. JACKSON.

It is about seven years ago that, after spending eight months in the Arctic, I made up my mind to revisit and explore that alluring part of the earth.

It is nearly a year and a half ago that I first published my plans for an expedition to the unknown Polar area lying north of Franz Josef Land. Of what I was able to do last winter on the shores of the Kara and Barents Seas you may have heard a little; and to-day I am glad to be able to say that I am on the eve of leading a fully-equipped expedition to the North.

Of the physical geography of Franz Josef Land you have only recently read a summary. My friend Mr. Arthur Montefiore, a Fellow of the Geological Society and of ours, wrote in the June issue of your Journal a "Note" on the geography of Franz Josef Land, in which he brought together and put into a small compass a mass of detail which may be found in the pages of Payer. Some information, too, he gathered from the notes that appeared in the old 'Proceedings' of Mr. Leigh Smith's yachting voyages to that country. It is unnecessary, therefore, for me to make more than passing references to this branch of the subject; and I will proceed at once to the main considerations which induced me to select Franz Josef Land as the first objective of my expedition.

These considerations took the form of distinct advantages, and are four in number:—

I. The accessibility of Franz Josef Land late in the summer when approached along the meridian of 45° E., or some meridian between that of 45° E. and 50° E. This accessibility has been proved, in my opinion, by the voyages of Mr. Leigh Smith and the little Dutch ship the *Willem Barents*.

II. The northward extension of Franz Josef Land to a latitude as high as 82·5° at C. Fligely, and some twenty or so miles further if we accept Payer's view that C. Sherard Osborne is continuous with that portion of the country he called Prince Rodolf's Land. The long stretch of *terra firma* forms a safe route for advance and retreat, and provides all we need in the way of sites for our depôts and cairns.

III. The still further extension to the north of what, perhaps, I should call the Franz Josef Land group. Standing on C. Fligely, Payer saw, 60 or 70 miles to the north, the high outlines of an ice-covered land of apparently large extent. This he called Petermann Land, and this land lies undoubtedly in a latitude as far north as any yet reached. There is absolutely nothing known of it beyond this, but it is a reasonable hypothesis to maintain that a land of such elevation would probably reach at least to the 84th degree north latitude, and who knows how much farther?

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* Read at the Royal Geographical Society, June 25, 1894.

It is this land which we shall try to reach after we have safely landed, and, in the early days of the following spring, marched over the ice of Austria Sound, a gulf which penetrates the country to C. Fligely; or, if this be not so favourable to us as it proved to Payer, along the shores that reach down to the Sound.

IV. The fourth consideration is provided by the observations of Payer, confirmed by the winter experience of Mr. Leigh Smith. And this consideration is a strong one—the great abundance of animal life on the southern shores of Franz Josef Land during the winter, as well as in the summer. In the winter and spring, of course, this is due to open water. It is owing to this that I regard with equanimity the winter seasons of this northern land. Given fresh meat and enough of it, I believe we shall be able to combat that form of anæmia which we call the scurvy. Blood to the bloodless; and it is man's unfailing tendency to become bloodless if he sojourns long in the extremes of the Arctic.

I should mention, in passing, that my friend Dr. Neale, who was surgeon to Mr. Leigh Smith's party, had a most anxious and difficult work before him to keep that party in health. With little food, no furs, no special equipment, he kept between twenty and thirty men in health all through the long winter in the North; and I attribute his success to his insistence on fresh meat, and the ingenious way in which he froze and used the blood of the game his party killed. It is quite possible we should have heard more of this remedy before now, but two things have been against our doing so: the one is the fact that much Arctic exploration has been carried on where game was scarce; and the other is the mistake that many explorers have made in taking so many men with them. It would be almost impossible, even in a country exceedingly rich in game, to provide for the daily wants of a hundred and fifty men. In fact, expeditions have been too large; but the day of large expeditions is, I believe, gone; and Nansen sails into the ice with thirteen men, and we disembark on Franz Josef Land with no more than eight or nine.

There is a further consideration which weighs a good deal with me: it is that significant statement of Payer that nearly the whole of the ice of Austria Sound is level, and easy to traverse, and of not more than one year's growth. He wrote of his experience in the month of April, and this is the same thing as saying that in the months of August and September we should find Austria Sound navigable. Should this really prove the case, the facility it will give for transporting heavy loads from the southern shores of Franz Josef Land to the latitude of C. Fligely or C. Sherard Osborne would be an important factor in the success and rapidity of our advance. I do not base my plans, however, on this hypothesis: and, whether the Sound be open or whether it be closed, we hope to make sure and moderately rapid progress up it to at least the 82nd parallel.

But one of the great features of our plan, and the advantages of our chosen route, may be found in the almost elaborate series of depôts which it is our present intention to erect. It is obvious to any one that no party, whether small or large, can transport in one or two or even three journeys all the food, clothing, apparatus, and the like that it will require for three or four years. Of flour alone, we calculate, one man will consume nearly 1500 lbs.; of meat, more than 2400 lbs.; of so apparently insignificant an article as jam, nearly 200 lbs.! Our supplies, therefore, will be moved up from the base to the first depôt, and then from depôt to depôt, until we have behind us a long array of well-stocked larders; and at the last require only to carry with us food for a few weeks. When we may want to travel most rapidly—as in the case of open water—then we shall be least burdened with *impedimenta*.

I will now say a few words on the outfitting of this expedition; but it is my first duty and sincere pleasure to inform you that in Mr. Alfred C. Harmsworth, a Fellow of our Society, I have found a munificent and a most sympathetic friend. He is bearing the whole of the large cost of this expedition, partly because he has had a long-standing interest in Arctic work, and partly because he has an enthusiastic patriotism. To see England resume the work she did so splendidly in the past is, I believe, his great desire. But I should not be doing justice to him if I merely referred to his expenditure of large sums of money; for he is doing more. He is daily giving us his time, his thought, his advice, and his personal service, and sparing no pains to make the expedition successful.

The ship in which we sail from the Thames in July is the *Windward*, the well-known Peterhead whaler, built with special reference to ice navigation, and consequently of enormous strength. She is wooden, of course; and while she steams at a rate of some six knots an hour—quite fast enough for ice work—she is also heavily rigged as a barque, and is an admirable sailer. Her dimensions are as follows: Length, from the stem to the stern, 118½ feet; beam, 28¾ feet; depth, 16½ feet. Her engine-room is 20 feet long; her engines of rather more than 30 h.p.; her gross tonnage is 321; her net registered, 245. She will, I hope, sail from England as a yacht, and her yacht measurement would reach nearly 400 tons. Deducting space for accommodation, her cubic contents is about 700 metres.

It is my intention to send the *Windward* back if we land, as we hope, on Franz Josef Land, or on one of the islands that form a chain along its southern coast, early in September. For many reasons this is a prudent step. A sailor is not necessarily adapted to land marching;

and even if we secured a crew in every sense qualified for Arctic exploration on land, the mere fact of the number being more than is required for the work would impel me to the same step. Consequently we have what we call the land party—a small number of picked men; and the crew—picked men, of course, but not picked with special reference to sledging. In the *Windward* this land party will be accommodated in the cabin aft; the officers of the ship will have comfortable quarters on the between-decks amidships, and the crew, of course, will retain their forecastle.

Perhaps the most striking feature on deck when we leave the Thames will be the boats. Of boats we have several types, foremost, of course, being the familiar whaling boat—strong, reliable, but very heavy. Next is a copper boat, with deep collapsible canvas gunwales, the outcome of the ingenuity of the Rev. E. L. Berthon. Then there is an aluminium boat, built on the lines of the copper boat, but of course very much lighter. The aluminium boat weighs 150 lbs.; it is built in three sections, and, as we have a duplicate of the middle section, we consequently have what is practically two boats. The next boats are of light pine wood, bolted and pinned with oak. They come from Norway, where they are much used for fishing. Finally, there is a large birch-bark canoe, very light and strong, and likely to be useful whenever we have open water, and would go fishing or what not. It is possible that before we sail yet another boat will be added, fitted with a simple but powerful oil-engine. She would be most useful for rapid journeys or reconnoitring, and as a tug for the store-laden whalers. As to weight, the copper boat is less than 200 lbs.; the Norwegian boat lighter still; and the aluminium boat lightest of all.

The next article to which I would draw your attention is the sledge. This sledge is of the well-known narrow type, but has some modifications which my winter journey last year has led me to introduce. Of sledges we have seventeen, and their length varies from 9 feet 6 inches to 13 feet 6 inches; their width is 18 inches, height 6 inches. The weight of the shorter sledges is 16 lbs.; of the longest, 23 lbs. They will readily carry a load of 300 lbs.; and the ski which form their runners offer little or no resistance to the frozen snow. The wood they are made of is ash, and the side rails are in some cases of bamboo. Pliability and "play" are the main elements of their strength, every part being united and lashed with hide thongs. Their elasticity is great, and their strength gains by this.

Of ski we have twenty-four pairs, carefully selected under the directions and advice of Mr. Alexander Nansen, the able brother of the explorer. Some have feet fastenings after the familiar Norwegian pattern, and some are fitted with fastenings somewhat modified in accordance with my own experience. I may mention here the double-ski sticks we are taking, as well as the Alpine ash-poles and ice-axes.

I now come to the furs. These form, perhaps, one of the most interesting parts of the equipment. I place first and foremost the fur clothing of the Samoyeds, which I am adopting for the winter and spring wear of our expedition. The first garb is the reindeer-skin militza, a tunic made of brown reindeer hide with the fur inside, and slipped over the head. The mitts are attached to the sleeve, but there is a small slit above the wrist for thrusting the hand through when necessary. When girded up with a belt about the waist, the militza forms a more comfortable, warmer, and more convenient garment for Arctic weather than any I know. The Samoyeds, by the way, are far ahead of the Eskimo in their skill in fur-working. The next garment is the siluke, made on the same pattern as the militza, but of the white reindeer skin, and with the hair outside. The pimmies or long boots and leupthieu (or skin stocking) of the Samoyeds will form our usual footwear; but owing to the varying conditions of snow, we are taking a considerable variety of boots specially adapted to each condition. Thus we have heavy elk-skin boots; the lighter Finnesko; long boots for wet snow, etc. The sleeping bags are made of reindeer skin, and are both strong and light. Of spare skins for mending and making clothes we have a good number.

Our travelling tents are two in number, and very light, being only about 30 lbs. in weight, in spite of their double walls and ribs. They shut up much like a Chinese lantern, being crescent-shaped when closed, and domed when opened. The houses at the southern depôt or base will be more solid. There are, first of all, three trebly walled houses, built partly of special air-tight canvas and partly of wood, and lined with felt. Air is admitted from the outside under the double floor, and escapes into the room as heated air through the stove. A Russian loghouse will also be taken—we call for it at Arkhangel—and there are a stable, made on the circus plan, a dog's house, store-room, etc.

Of scientific instruments we are taking a number. In addition to the ordinary astronomical instruments—many of which are specially constructed of aluminium, and exceedingly light—we are indebted to the Meteorological Office for the loan of a set of meteorological instruments, and to Kew for instruments for magnetic observations. Careful preparations have been made for collecting and examining botanical and geological specimens; zoology will receive special attention.

I must pass over a number of details, for time presses, and say just a few words on the living side of the expedition; and, first, about my companions. Although besieged by applicants, our choice has been made so slowly and carefully that, at the time of writing, our final selection from a number of candidates has not been made with regard to one or two posts. In Mr. A. Armitage, second officer in the P. and O. Service, and a lieutenant in the R.N.R., I have found a skilled nautical astronomer and a valuable colleague; in Mr. Reginald Kettlits, M.R.C.S., L.R.C.P., a highly competent medical officer and an enthusiastic geologist; in Mr. H. Fisher, the Botanical Curator of the Museum, University College, Nottingham, an ardent collector of wide experience; in Mr. Childs, a mineralogist who is at once a clever chemist and a highly skilled carpenter, engineer, and photographer; in Captain Schlosshauer, the combined experience of a backwoodsman and a captain in the Mercantile Marine; in Mr. H. A. H. Dunsford, a traveller and practical surveyor of many years' experience; and in Mr. Sydney Burgess, an all-round man, who has twice visited Arctic regions as a surveyor. But no man has been chosen for merely one quality or merit, and every man is sound in wind and limb, and calculated, I trust, to endure the seasons we may expect.

The ponies, which will be taken for the first time, I believe, in the history of Arctic exploration, we pick up at Arkhangel on our way out. They will not exceed four in number, and I hope will prove very useful. Their strength, and speed, and pluck I tested last winter under conditions of extreme cold and severity, and my admiration for them, and their endurance on the barest allowance of keep, is great. The dogs have been procured for us from Western Siberia through the courtesy and energy of Mr. Henry Howard, C.B., the Acting British Minister at St. Petersburg; and they are now well on their way to Khabarova, on the Yugorski Schar, where we call for them before finally sailing for Franz Josef Land. They are thirty in number, and of the breed used by the natives living in the valley of the Ob. Inferior, perhaps, to the fine animals of Eastern Siberia, they are distinctly superior to the more familiar Eskimo dog.

This very brief survey of our preparations must now draw to a close. It only remains to me to acknowledge the assistance I have received during the past and present year from Mr. Arthur Montefiore, whose tireless energy as honorary secretary to the expedition has been enthusiastically applied to every kind of detail connected with it; to acknowledge also the care with which Mr. Coles, your curator, has supervised the scientific equipment; to thank Mr. G. S. Boulger, F.L.S., our adviser in botany; Mr. Wm. Topley, F.R.S., for his help in training our geologist; Mr. Wm. Harkness, F.C.S., of Somerset House, for his advice regarding our foods; the P. and O. Company for placing Mr. Armitage's services at our disposal; and Captain Wilson Barker, of H.M.S. *Worcester*, for similar help; and Mr. J. R. Jeaffreson for help in many ways; to thank those numerous well-wishers who approve our plans and repose such confidence in us; and to express my gratitude to you for your kind reception to-night.

Before the reading of the paper, the PRESIDENT said: The paper is intended to give us some account of the intentions of Mr. Jackson, who is to attempt to explore the regions of Franz Josef Land. We have present with us this evening Mr.

Harmsworth, who has organized and most munificently found the funds for the expedition which Mr. Jackson is to command. We have Mr. Jackson himself here, and I am glad to see also Lieut. Armitage, R.N.R. I will not say any more at this moment, but ask Mr. Jackson to proceed to read his paper to us.

After the reading of the paper, the following remarks were made:—

Mr. ALFRED C. HARMSWORTH: I had very much rather not speak until the expedition returns, for at the present time it sounds, I think, very much like brag to talk of its prospects. I may say I have firm confidence in Mr. Jackson. He, I should like to remark, is actuated not only by a desire to get to the North Pole, but by a wish to explore the land Payer discovered, and Mr. Leigh Smith, geographically speaking, did so much for, to bring back careful records of magnetic, astronomical, geological, botanical, and zoological observations, and other information useful to scientists, who are looking forward with a great deal of hope to the expedition. Concerning the expedition Mr. Jackson has already spoken, but he has said very little about himself. He has had a great deal more experience in Arctic regions than is generally known. Last season he made a 4000 miles' sledge journey, principally to master the difficulties and see the kind of costume best for the work. The representations of these you have seen; they are the result of very careful observation, and will have a great deal to do with the welfare of this expedition. Mr. Jackson has taken a more carefully selected supply of food than has been taken before, and Mr. Markham, I believe, thoroughly agrees with its suitability.

The PRESIDENT: There can be no doubt in the minds of geographical students that the most interesting quarter of the Arctic regions has been selected for exploration. I am also quite convinced that the expedition will be carried through to a successful issue, owing to the careful way in which all the gear has been chosen, and all the arrangements have been made. I have found, from conversations with Mr. Harmsworth and Mr. Jackson, that they have considered very carefully all the equipments of previous Arctic expeditions, and have selected what they believe to be best—and on many points I agree with them, that they are the best they can procure. I am particularly glad to find with what care Mr. Harmsworth has personally superintended the work of selecting provisions for the expedition, which I look upon as the most important part of all. The plan of pushing forward an advance party by means of dogs is, according to all Arctic experience, by far the best, and I think, under ordinarily favourable circumstances, they ought to make an advance of several hundred miles beyond the farthest point reached by Lieut. Payer. We shall all look with great interest to the progress of the expedition and for its safe return, and in the meanwhile, on the part of this Society, I can assure Mr. Harmsworth that any aid, any help, any advice we can give him, we most freely and gladly offer. In returning thanks to Mr. Jackson for the interesting account he has given of his equipment, I am sure the whole meeting will join very heartily with me in wishing the utmost success to the Jackson-Harmsworth Polar Expedition.

RECENT GEOGRAPHICAL WORK BY THE UNITED STATES GEOLOGICAL SURVEY.

By MARCUS BAKER, OF THE UNITED STATES SURVEY.

THE work of the United States Geographical Survey is only in part suggested by its official name. Its energies and resources now are, and from the beginning have been, about equally divided between topographical and geological work. For the current year's work Congress has authorized the expenditure of £83,000, of which £40,000 are specifically set apart for "topographical surveys in various parts of the United States." During the past decade there have been annually expended on its work a little more than £100,000, of which 40 to 45 per cent. has been devoted to making topographical surveys and maps.

The United States Geological Survey is, therefore, in fact, though not in official name, the United States Topographical and Geological Survey. It has a corps of topographers, who, working afield in summer and in office during winter, produce annually about 100 manuscript, contour, topographical maps ready for the engraver, these maps representing 40,000 to 50,000 square miles of country.

During the past year the area mapped was 42,000 square miles, situated in 19 states and territories. This work was done wholly upon two scales, called for brevity the "mile-scale" and the "two-mile scale." In the *mile-scale* work one mile of distance on the ground is represented by one inch, approximately, on the map. In the Ordnance maps it is one inch exactly, the ratio of map distance to actual distance being 1 to 63,360. In the United States topographical maps the ratio of map distance to true distance is 1 to 62,500 or 1 to 125,000. Formerly maps were also made by the Geological Survey on the scale of 1 to 250,000, or about 4 miles to 1 inch, but this scale is no longer used; all, except special work, being done upon scales of 1 to 62,500 (the mile-scale) or 1 to 125,000 (the two-mile scale).

Of the 42,000 square miles mapped the past year, 27,000 square miles is on the mile-scale and 15,000 square miles on the two-mile scale.

The atlas sheets of the mile-scale work cover 15 minutes of latitude by 15 minutes of longitude, or one-sixteenth of a "square degree." They are thus uniformly very nearly 17 inches long by from 12 to 16 inches wide. Similarly the sheets of the two-mile work cover 30 minutes of latitude by 30 minutes of longitude, or one-quarter of a "square degree," and are of the same size as the mile-scale map sheets. In both these cases all public culture is shown, all drainage and water bodies and all surface irregularities capable of expression, by means of the adopted contour interval. In the mile-scale maps the contour interval is in ordinary cases 20 feet. In flat country, however—for example, on some parts of the Atlantic coastal plain—the contour interval is made 10 feet, while in exceptionally flat country, such as the Dismal Swamp or Mississippi delta, a contour interval of 5 feet has been used. In the two-mile maps the contour interval is larger, usually 50 or 100 feet. This scale has been extensively used for sparsely settled areas, for the great plains, and for rough and mountainous areas, while the somewhat more costly mile-scale work has been for the most part confined to the more populous regions or those long settled. As the survey progresses there has been an increasing tendency to mile-scale work and a diminishing tendency toward two-mile work. Thus, while the actual number of square miles mapped the past year, 42,000, is smaller than in some past years, the number of map sheets is about 130, a large number for one year.

As already indicated, work is simultaneously carried on in many localities. Demand for surveys and maps come urgently from many localities, and selection must needs be made of the most important. This selection has been aided in some states by the co-operation of those states.

In 1884 it was proposed to map Massachusetts on the two-mile scale. That state, however, desired a larger scale map, and after a full discussion, its legislature agreed to pay one-half of the estimated cost of mapping the state on the larger or mile-scale. A basis of co-operation was drafted and agreed upon. Under this arrangement a topographical map of Massachusetts, in 53 sheets, was completed in 1888, at the joint expense of the United States and Massachusetts. Other states followed, and by the close of the year 1891 four of the older and smaller states had co-operated with the Geological Survey and secured mile-scale topographical contour maps of their entire area, as follows:—New Jersey, area 7815 square miles, 52 atlas sheets; Massachusetts, area 8315 square miles, 53 atlas sheets; Rhode Island, area 1250 square miles, 15 atlas sheets; and Connecticut, area 4990 square miles, 33 atlas sheets.

Co-operation began with New York state in a small way in 1892, and was continued on a much enlarged scale in 1893. For the work of 1893 the state voted a sum of £6000. As a result, an area of about 5200 square miles was surveyed in that state last year, all on the mile-scale, yielding 29 sheets of the general topographical map of the United States. Work was carried on from 10 centres in various parts of the state, these centres being selected with a view to meeting the most urgent needs.

New York, nicknamed the Empire State, with an area of 49,000 square miles, is slightly smaller than England, with an area of 51,000 square miles. It lies within and near the southern limit of the great ice-sheet or ice-cap which in recent times, as the geologist counts time, covered all of northern North America and still covers Greenland. The surface of the state everywhere bears the impress of this ancient and thick ice-blanket. It is a region of rounded hill-forms and picturesque lakes, a region thickly studded with farms and orchards and proud of its fruits and dairy products. No topographical map of this region exists. A few years since, when it was proposed to make a map of the state, the legislators were told that we have a better and completer map of the moon than we have of the state of New York. Without vouching for the accuracy of the assertion, it is nevertheless true that no satisfactory map of it exists, and no contour map at all except of the most general character. All this seems now in a fair way of being remedied. Already 8960 square miles have been mapped, and if money for continuing the work is annually voted to the extent of last year, the survey of New York will be completed in about 8 years.

The complete mapping of a country so large as the United States is a great undertaking. The area involved (including Alaska) is 3,600,000 square miles, or about that of all Europe. Excluding Alaska, there still remains an area of about 3,000,000 square miles, constituting the United States ordinarily so called. To map out this great domain, to show in detail its hills and dales, its heights and depths, its lakes, its deserts, its marsh and swamp and forests, its towns, cities, and wide-spreading and rapidly growing system of roads and railroads,—this is the work of the topographical branch of the United States Geological Survey. Upon this work it entered in 1882. Twelve years have since elapsed, and 610,000 square miles, or about one-fifth of the country, is now mapped. In this number is included a small district of country in the far west, mapped on a scale of 4 miles to 1 inch, by the surveys which preceded the present Geological Survey.

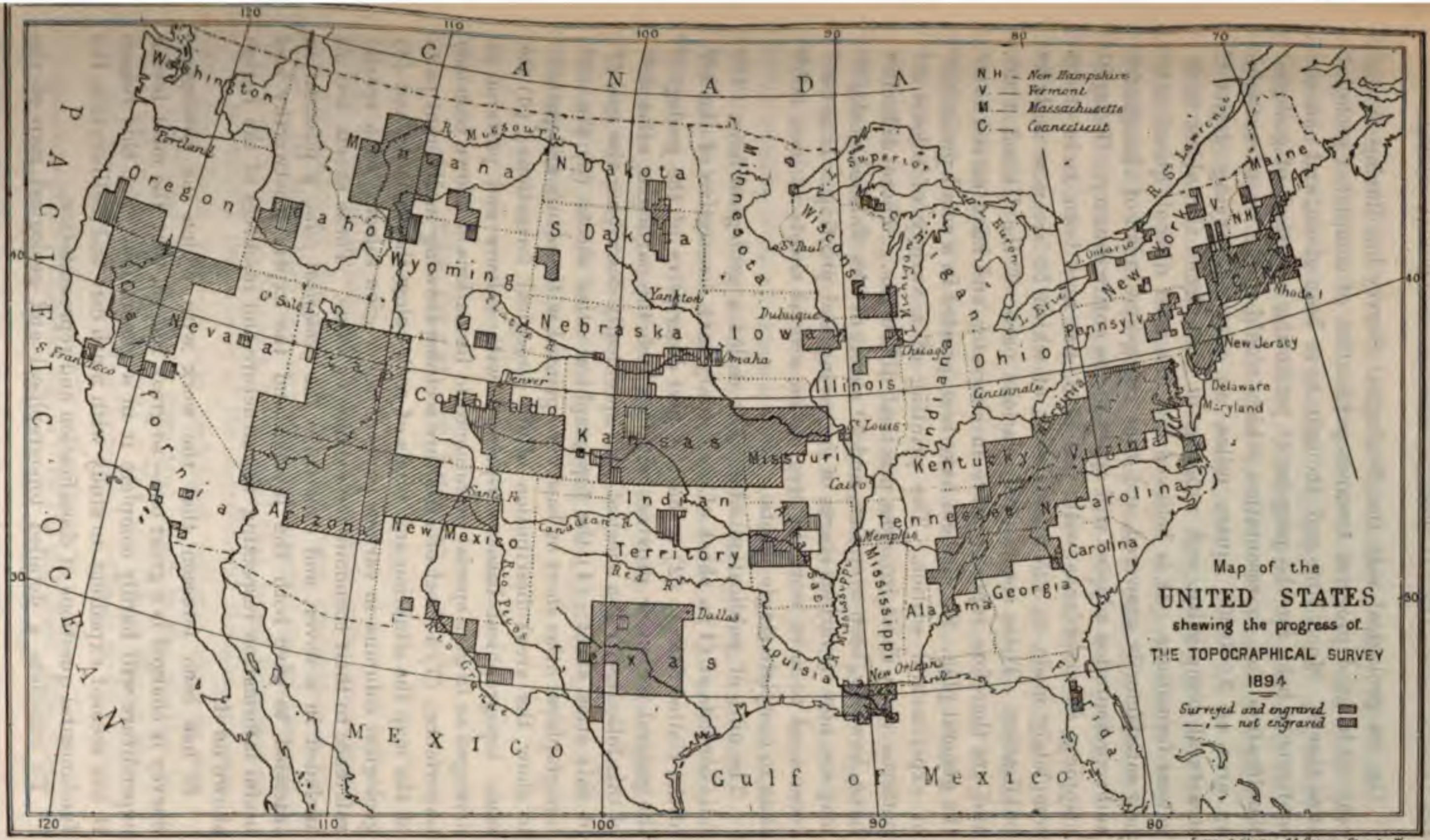
The number of atlas sheets produced per year is nearly 100. The number produced during 1893 was 130, an unusually large number.

All the maps are engraved upon copper. They are printed in three colours—black for all cultural features, blue for all water bodies and features, and brown for all relief features. This requires that three copper-plates be engraved for each atlas sheet. This engraving is done in part by contracts with engraving firms, and in part in the engraving division of the Survey, the cost varying from £45 to £50 per atlas sheet.

The order of procedure resulting in the printed topographical map is as follows:—

The topographers beginning in May or June prosecute field-work as long as the weather is favourable, usually into November or even December. Then returning to the central office in Washington, they complete the drawings ready for the engraver, "inking in" the field sheets, adding the names and putting all in final form. Resulting from work thus begun in May of one year, there are in the following May 90 to 120 atlas sheets ready for engraving. The topographers now resume field-work, and the atlas sheets just completed are passed on to the engravers, who in the course of the year engrave them. Thus the engraving is in general one year behind the drawing. As soon as engraved, a small edition is printed in the Survey office, and this small edition is used to supply the geologists with base maps, to supply engineers and others in projecting and constructing works of internal improvement, and also copies are sent to a few large libraries.

The number of atlas sheets thus used last year was about 30,000. The number of atlas sheets surveyed last year was about 130, and the number engraved 77. The total number of topographical atlas sheets now engraved (February, 1894), and ready for printing from stone transfers, is 750.



Turner & Shaw, 43 Brewer Street. W.

On its geological side the Geological Survey has during the past year made good progress towards publication of completed geological atlas sheets. Much time and thought have been given, and numerous conferences held, for the purpose of perfecting a system of geological classification and representation which would apply to so extensive an area as 3,000,000 square miles, an area of varying degree of structural complexity, and ranging in time from the oldest to the newest formations. It is believed that the most difficult questions are now satisfactorily answered, and that the general plan of classification and representation adopted will apply to the entire country. Geological mapping, in accordance with this plan, has now been more or less completely made on 125 atlas sheets, of which 50 are now ready for publication. These sheets cover various parts of the United States, and are therefore representative in character, and have served to test the general plan. Six of them have been printed in a small preliminary or experimental edition. The printing of a variety of colours and patterns on a sheet involves practical difficulties. These difficulties have, however, been overcome, and 20 sheets of the finished geological map are now in various stages of engraving and printing. It is found economical to have work in progress on several sheets at once rather than to complete single sheets.

The unit of publication adopted is called a geological folio. This folio consists of (1) a sheet of elementary text descriptive of the map of the United States; (2) a sheet of text descriptive of the geology of the general region or province within which the particular atlas sheet of this folio lies; (3) a sheet of text specifically describing the geology of this atlas sheet; (4) the topographical atlas sheet; (5) the same topographical atlas sheet or base over-printed with colours and patterns to show the areal distribution of its geological formations; (6) the same topographical base over-printed with colours and patterns so arranged as to give special prominence to formations of known economic importance; (7) a sheet of structure sections showing in different parts of the map the situation and kinds of rock below the surface; and (8) geological columns in various parts of the region selected with special reference to their economic importance or value. These sheets are all included in a cover, and constitute the *geological folio*, a publication intended to give both the layman and the expert trustworthy and useful information respecting the structure and resources of the region shown on it.

It has been foreseen that the work with which the Geological Survey is charged is a great one—so great, indeed, that the most lavish expenditure will hardly complete it in a generation. For this reason it has seemed expedient to study with much care and deliberation the fundamental questions of classification and representation.

To complete a detailed topographical and geological map of the

United States will, as already shown, take many years. But meanwhile, enough preliminary or reconnaissance work has been done to permit the construction of a general topographical and a general geological map of the United States. Such general topographical map was published by the Geological Survey in 1890. It is now undergoing revision preparatory to printing a new edition.

This topographical map is on a scale of 1 to 2,500,000, or about 40 miles to 1 inch. It is composed of 9 sheets, which combined form a wall map 6½ by 4 feet. It resembles in general form and character the detailed atlas sheets, being engraved upon copper and printed in three colours—black for cultural features, blue for water features, and brown contours for relief features. With certain minor exceptions the contour interval is 1000 feet. For portions of the country the data now available is sufficient for an accurate map on this scale; for other parts it is insufficient, and revision must needs be made from time to time to bring the map up to date.

With the foregoing map as a base, the manuscript of a geological map of the United States has been prepared, and is now in the hands of the engraver. While this map must of necessity be subject to extensive revision, and while not all will agree that even now it perfectly accords with all known facts, it nevertheless is doubtless as satisfactory as any that could be compiled from present knowledge. It is planned to have an edition of it printed before the end of the present year.

The accompanying map shows the progress made by the Geological Survey in preparing the topographical base map of the United States; a map designed as the base for a geological map, but also intended to serve as a general topographical map.

THE ISLAND OF ENGAÑO.*

By DR. F. H. H. GUILLEMARD.

The public is indirectly indebted to the Netherlands India Government for the appearance of this book, as we learn from the author on its first page. Dr. Modigliani had succeeded in escaping the vigilance of the Dutch authorities in Sumatra, had crossed that island from west to east, had penetrated the country of the independent Battaks, and was contemplating fresh journeys into prohibited regions, when he was suddenly confronted by an official document which, in the position he then was, put an end to all his plans. "You will inform Signor Modigliani," ran the instructions to the Controleur, "that it is for the last time that H. E. the Governor warns him not to travel beyond the limits of the districts administered by Government; and that if Signor Modigliani should continue, in spite of this warning, to travel in the independent territory, the Governor will withdraw the permission given him to travel in other parts of Sumatra." It is possible that Dr. Modigliani did not always recognize the importance of gaining the support of the Dutch authorities, who are for the most part extremely courteous to scientific travellers; but be this as it may, the result was that, finding his plans for the exploration of the mainland thwarted, he was once again led to turn his attention to the chain of islands lying off its western coast.

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* 'L'Isola delle Donne: Viaggio ad Engano.' By Elio Modigliani. Milan, Ulrich Hoepli, 1894. Large 8vo, pp. 312, with 75 illustrations and sketch-map.

Dr. Modigliani's travels in Pulo Nias had given him results of considerable scientific interest, which he published in his 'Viaggio a Nias' in 1890. This island, which lies towards the northern end of the chain, is the largest, and was already tolerably well known. Engaño, on the other hand, the most southerly of them, had very rarely been visited, and was nearly virgin ground for the naturalist. It might, therefore, be expected to afford the explorer something of interest, in spite of its unimportant size; and it may be said to have fulfilled these expectations, for the author is led to form conclusions not only as to the origin ot the natives, but as to the geological history of the island itself, which, if not absolutely unassailable, are very plausible, and at the same time certainly novel.

The author, in addition to the description of his travels, gives a chapter upon the earlier notices of the island. That its name must have been conferred by one of the early Portuguese or Spanish navigators is evident, but he has not been able to throw any light upon the question as to the voyage which first brought it to the knowledge of Europeans, and the first recorded occurrence of the name is in the itinerary of Van Linschoten's voyage in 1596. Up to the middle of the present century Engaño remained little more than a name, but since then it has from time to time been visited by the Dutch officials, and occasional notices of it published in the reports of the Batavian societies. None of these, however, with two exceptions, afford much information. The two exceptions are Von Rosenberg's narrative of his fortnight's visit in 1852,* and the fuller account of Controleur O. L. Helfrich, who appears to have stayed on the island for some time in 1886.† Signor Modigliani's residence was from the beginning of May to mid July, 1891.

Engaño is of small size, not exceeding 15 miles in its greatest diameter, and its highest elevation is stated to be about 380 feet. It appears to be composed of coralline limestone, and to be completely surrounded by reefs, while its surface is almost entirely covered with forest. To the Malay traders and the inhabitants of the mainland it is known as Pulo Telangiang. The Enganese themselves, as is so often the case among island peoples, have no name for it, merely speaking of it as "the land" or "the island;" and the European appellation is, of course, unknown. The English Admiralty chart, in the author's opinion, is inaccurate, but he states that he was unable to rectify it, owing to his having been attacked with illness just as he was commencing a rough survey of the south-east portion of the island. The climate is described as being far from healthy, and Dr. Modigliani suffered much from malarial fever, though it is possible that his attacks may have been the outcome of his journeys in Sumatra. The mosquitoes are well-nigh intolerable; so much so, indeed, that he declares they have modified native domestic architecture, and led to the construction of huts of a very peculiar type, to which we shall have presently to refer.

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* 'Tijdschrift v. Indische Taal-, Land- en Volkenkunde,' iii.

† 'Tijdschrift v. h. Nederlandsch Aardrijkskundig Genootschap,' 1888.

Although Dr. Modigliani presumably travelled primarily as a collector of objects of natural history, the reader who expects to find in his volume accounts of the habits and life-history of plants and animals—such field-naturalists' lore, in short, that makes the volumes of Darwin, Bates, or Wallace such charming reading—will be disappointed. There is no attempt at anything of the kind in the book, although from time to time mention occurs of various new species discovered by the traveller. Nor is this atoned for by any lists of the plants and animals obtained, which might very well have found place in an appendix, especially as the collections have been described in publications not of easy access to every one. The ethnologist is better treated, and upon the manners and customs of the people, their language, dress, weapons, and carvings, there is a very considerable amount of information, which is for the most part of unusual interest.

The Enganese of the coast, or rather of those parts of it visited by the Malay and Chinese traders, are of very varied type, and may be said almost to have incorporated themselves with these two races. It is only in the villages of the interior that those of pure blood can be found. Here they exhibit characteristics peculiar to diverse races, enlarging the ear-lobe to a ring as do many of the tribes in New Guinea and the Melanesian islands, carving wood with great dexterity and taste, the human figure being a favourite subject for representation, and making anthropomorphic figure-heads to their praus of the same material. Other eastern links are the suckling of the lower animals (chiefly puppies) by the women, and the non-existence of betel-chewing. On the other hand, the spears, krisses, and very large shields in use are evidently of Malay type. In physique, the people, though not averaging more than 5 feet 2 inches in the case of the men, and 4 feet 9 inches in that of the women, are described by Dr. Modigliani as strong and well built, and easily able to carry 70 lbs. weight of baggage on a long day's march. The type, as far as can be judged from the excellent illustrations, does not depart greatly from the average Malay, except that the upper lip is unusually long, while the mouth is very commonly held wide open. This latter habit is specially remarked upon by the author, and appears in some of the illustrations, giving a curious aspect of astonishment to the individual. In spite of their muscular strength, the islanders appear to be neither long-lived nor healthy, and the decrease in their numbers is only paralleled by the depopulation which has taken place in so many of the Pacific Islands. Here, however, it cannot be so easily accounted for, for civilization is practically non-existent. Spirits, it is true, have been introduced to a certain extent, but clothes, though possessed in abundance, do not appear to be habitually worn; and of the two, the latter are probably the most deadly in their effect. Signor Modigliani, it may be parenthetically remarked, has something to answer for upon this point, for his most successful articles of barter were old theatrical costumes, and future travellers must not be astonished at a meeting with Mephistopheles and other still more startling figures which this ingenious author confesses to have introduced! In a short time, however, it is probable that there will be no actors left upon this novel stage. In 1868 the population was ascertained by the Dutch authorities to be about 6500. Now Dr. Modigliani declares that there are not more than 500 to 600 remaining; the result, he considers, of the prevalent custom of procuring abortion, and the general laxity of morals.

The two most striking features of the Enganese are their houses, and the elaborate carving to which allusion has been made. The former almost exactly resemble beehives, except that the roof is of slightly higher pitch. They are elevated on piles some 10 feet or more from the ground, and are entirely thatched with the leaves of the nipa-palm. The circular room thus formed has a diameter of about 12 feet, and is windowless, the light entering only by the door, which is of oval form, and hardly more than 15 inches in its longest measurement. Through this the owner enters head-foremost, and only with considerable difficulty, access to it being afforded by an upright notched pole—a method widely in use in Malaysia. The doorway is cut out of a single block of wood, and is closed by a door upon which figure the most elaborate examples of the carver's skill. Dr. Modigliani gives illustrations of eleven of these doors, which are certainly most remarkable productions for people so low in the scale of civilization, and hazards the opinion that the islanders obtained their ideas on decorative art from foreign objects that have in some manner reached their hands, possibly as the result of some of the shipwrecks which are known to have occurred on the formidable reefs by which the island is surrounded. But most readers of his book will probably think such an explanation unnecessary, for these carvings appear so varied in design and application, and, to judge from the numerous forms of the extraordinary *epácu* head-dress which he figures, so intolerant of fixed model, that it is more natural to look upon them as the outcome of unassisted native talent.

A large portion of the book is devoted to an account of the customs, beliefs, and superstitions of the islanders, which need not be referred to here. The people appear to be very harmless, and though arms are from long custom carried by every one, they are but seldom used. Theft is almost unknown. One of the chiefs informed Dr. Modigliani, when he desired to leave some baggage in his charge, that it was sufficient to cord it with rattan and leave it where it was, or tie it up to a tree, and it would remain untouched. Similar methods are employed in other parts of Malaysia, but are successful only from the fear of the would-be thief of some protecting charm. In Engaño, however, the people seem to be preternaturally virtuous in this respect, and, indeed, have many good qualities; one of the most useful to themselves being the fastidious cleanliness of their dwellings and villages. Agriculture is very primitive: the coco-palm and banana supply nearly the only means of subsistence, for rice is unknown. Some of the forest produce would be valuable if trade were to become established; trees such as the *Morbó* (*Intsia amboinensis*), the *Bagu* (*Gnetum gnomon*), rattan, bamboo, nibong and others.

The question of the origin of the Enganese is perhaps the most interesting of those considered by the author. By Von Rosenberg they were described as Negritos, but it is hard to say upon what grounds, for their height and general build, and the absence of frizzliness in the hair, at once differentiates them. Oudemans considers them to be Battaks, who first peopled Nias and thence extended themselves south-eastward throughout the chain of islands; but Dr. Modigliani, who is probably better acquainted with the Battaks than any other European, declares that he cannot perceive the slightest trace of physical resemblance between the two peoples, and, judging from his vocabularies, there is certainly no linguistic connection. He does, however, find a marked resemblance to the Nicobarese, not only in physical appearance, but also with regard to customs and architecture, and gives illustrations in support of this view which are rather striking, though more evidence is of course necessary to promote the theory from the region of conjecture into that of probability. The fauna of Engaño is stated to show marked differences from that of Sumatra except with regard to its birds, and more or less affinity with that of the Nicobars, and it is suggested by Mr. W. Doherty that the islands fringing the south-western coast of Sumatra are, with the Andamans and Nicobars, the remains of a peninsula which jutted out from Pegu at some geological period when Sumatra was not in existence as a continuous land, but represented only by a few scattered volcanic peaks rising from the sea. Mr. A. R. Wallace, it may be remembered, holds that the fringing islands undoubtedly formed part of Sumatra at no very distant period. Professor Vinciguerra *

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* 'Ann. Mus. Civ. di Genova,' 2nd series, xii., 1892.

reconciles these two apparently contradictory theories by adopting both, believing that by volcanic action and upheaval the insular peaks became joined to Mr. Doherty's hypothetical peninsula, and that the chain of islands were separated during a later epoch of subsidence.

Dr. Modigliani gives a bibliography of the island, and a careful vocabulary of about 600 words and phrases in the Nias, Enganese, and Battak tongues, the latter being of the language spoken in the district round the Toba lake. The chief fault of his book lies in the poverty and complete uselessness of the index. The names of places are not always to be found upon the map at the end of the volume, and both the title and arrangement of the book might have been altered with advantage. The 'Viaggio a Nias' is far superior to the present volume in almost every respect. But it is hard to say anything in dispraise of a work which, published at the extraordinarily moderate price of four shillings (5 lire), gives us so much that is interesting in so new a field.

RECLUS' 'UNIVERSAL GEOGRAPHY.'[*]

By HALFORD J. MACKINDER, M.A.

To the roll of medallists which includes Murchison and Markham; Petermann and Keith Johnston, Yule and Somerville, the Council have this year fitly added the name of Elisée Reclus, author of the most complete geographical survey of the world of this or any other age.

The 'Géographie Universelle,' or, as M. Reclus evidently prefers to call it, 'La Terre et les Hommes,' must be pronounced a great achievement, were it considered only as a feat of literary endurance and courage. It consists of nineteen volumes, each composed of from 700 to 1000 pages, and it is illustrated with more than 3500 maps and nearly 1500 pictures. Every chapter is enriched for the student with a wealth of authorities accurately cited in notes. These facts become the more impressive when it is remembered that the work appeared in weekly instalments to subscribers, and that not once in the whole period did M. Reclus and his publishers fail to meet their engagement, though the author was at times far away amassing materials in the United States or Brazil. At the end of each volume is a note of acknowledgment dedicated to his collaborators—his informants and critics, his cartographers, artists, engravers, and readers for the press. After the appearance of the first few volumes, when the full importance of the undertaking became apparent, savants of all lands volunteered their help. Occasionally the death is mentioned of some old friend, thanked in the final notes of many previous volumes, and the reader is made to feel a personal interest in the busy company of workers. In short, M. Reclus is the man of affairs in literature, and the 'Géographie Universelle' is a triumph of organization.

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[*] 'La Géographie Universelle: La Terre et Les Hommes,' par Elisée Reclus. 19 vols. 1874–1894. Paris and London: Hachette et Cie.

M. Reclus has, however, given to his work what no mere organization and no amount of perseverance could produce—a clear plan, a lucid style, an unprejudiced view, and, in many places, philosophic thought. His plan is that of a journey through the world from Greece, westwards through Italy and Spain, thence northwards by France to Teutonic and Slavonic Europe, round Asia from the north through the east and south to the west, across the basin of the Nile to Barbary and the Sahara and so south to the Cape, and then, by one of the most original devices in the book, eastwards over the oceanic lands—Madagascar, the Mascarenes, the Malayan, Australian, Polynesian, and Antarctic regions. America is reserved for the last, and is treated of in five volumes, bearing the titles—Boreal America; United States; West Indies; Andean America; Amazonia and La Plata. M. Reclus views geography from the position of Strabo; he describes—both nature and man—and philosophizes, but gives little attention to the exact science of his subject. He is rarely profound, and never ventures beyond his depth. What he sees, however, he states forcibly, gracefully, and vividly. His aim is to visit each region, though not in person yet really, to live in it while he is writing of it, to sympathize with and understand its people, and finally to paint a picture for the use of his generation. He compares himself to a tiny droplet of water suspended in mid-air, reflecting for a moment every detail of the great world around. He spares no pains to "control" his authorities—to be true as well as graphic. It must be admitted that the French language lends itself admirably to the purposes of such a writer. When used by M. Reclus we have constantly to admire its fertility of resource for description, its insinuating delicacy when connecting cause and effect.

M. Reclus' philosophic views have an influence mainly good on his geography, and more particularly on his estimates of national character; they give to his judgments a detachment and freedom from current prejudices which are invaluable. It goes without saying that, in so great a crowd of statements, there are errors both of fact and opinion, but they are rarely of radical importance. Occasionally a sentence seems flavoured with a spice of *la perfide Albion*; once in a way a paragraph apologizes too vehemently for the author's fatherland, and excusing, accuses. Whatever its faults, however, M. Reclus' work is an authority for constant reference for the present generation, and will be an important landmark for the comparative geographers of all future time.

The 'Géographie Générale' is the greater part of a yet greater undertaking. M. Reclus conceives of geography as a science with a markedly human bias, but he does not deny to it the study of the globe as a physical unit, possessed of a life and evolution of its own. Before the commencement of his *magnum opus*, he wrote a work 'La Terre,' a treatise on purely physical geography, practi preface to 'La Terre et les Hommes;' and he still promises a mentary volume, to be written at his ease, dealing exclusively w human element in geography—a digest and generalization of his He has richly earned the right to speculate with the wealth created.

A VIEW OF ORMUS IN 1627.

By WILLIAM FOSTER.

Possibly some of the readers of the *Geographical Journal* will re an ancient sketch-map of Bombay harbour, which was found a few ago in one of the logs of the East India Company's vessels, an brought to notice by Sir George Birdwood in the reprint (1891) report on the early records of the India Office. This drawing att considerable attention at the time of its publication, and has sinc reproduced on more than one occasion. We are now enabled, b permission of the authorities, to give a facsimile of a second sketc the same journal, representing the once famous town and castle of O as they appeared in the year 1627.

Ormus is to-day little more than a name—a heap of slowly cru ruins, among which stand the mat huts of perhaps a couple of hu fishermen. The old Portuguese fort, only a degree less ruinous the town itself, looks over a bay whose waters are seldom disturb a European keel; and the handful of Persian soldiers who for garrison have little to do but keep guard over a few prisoners over from Bandar Abbasi for safe custody. But, as every one k this was not always so; on the contrary, there was a time whe island was one of the most important trading centres of the Eastern and its name was a synonym to Western ears for all that was w and magnificent.* Its situation at the entrance of the Persian made it a convenient halfway-house in the line of traffic from the to Europe *viâ* Aleppo; while on its own account it carried on a trade with India, especially in horses, obtained from the neighbo mainland. The early travellers vie with one another in extolli riches and the immensity of its traffic. "Ormus is a vast emp of the world," wrote Athanasius Nikitin in the fifteenth century; find there people and goods of every description;" and more t century later John Newbery found there "merchants of all nations" "very great trade."

Prosperity, however, brought with it its Nemesis in the sh attacks from would-be possessors of an island so rich and so admi situated. It at once attracted the notice of the great Albuquerque

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* Cp. 'Paradise Lost,' ii. 2.

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he entered upon his task of building up an empire for Portugal in the Eastern Seas. In 1507 he reduced the island, and commenced to erect a fortress. A mutiny of his captains forced him to abandon his project for a time; but eight years later he resumed his task, and did not leave the island until he had seen the fortress completed and equipped. The Portuguese domination was by no means tamely acquiesced in; and Arabs, Turks, and Persians tried in turn to oust the European intruders. At last, in 1622, the forces of Shah Abbas, with the assistance of some English ships from Surat, captured the fort after a desperate resistance. The garrison was deported to Goa, and the other inhabitants, it would seem, to Bandar Abbasi, to which port the Persians wished to divert the trade of the island; the town, already much damaged during the siege of the castle, was plundered of everything movable, even the stones of the houses being in many cases carried off for building material; and the island was left, as it has ever since remained, desolate and practically uninhabited.

Nearly five years had passed since the extinction of the town, when the author of our sketch—David Davies, master's mate of the East India Company's ship *Discovery*—found himself in Ormus roads with an idle hour on his hands, and utilized this leisure in putting on paper in his rough way the view which lay before him. After the marauding expedition down the Malabar coast, which produced the map of Bombay harbour already referred to, the *Discovery* returned to Surat, and thence, on December 15, 1626, sailed, in company with five other ships, some of which were apparently Dutch, with a cargo of goods for the factors at Gombroon. Their destination was reached on the 18th of the following month, and the holds were in due course emptied of their contents. There seems to have been little in the way of merchandise for the ships to take back to Surat, except what native traders might care to venture. It was necessary, therefore, to procure a quantity of ballast; and so on the 30th three of the vessels—the *Discovery* amongst them—were sent across to Ormus to fetch stones for this purpose from the ruins of the old town. This occupied them for five days, and it was during the period thus spent that Davies made his sketch, stretching it, as will be seen, across two pages of his journal. Their task ended, the three ships returned to their consorts, and at midnight on February 18 the fleet sailed for Surat, which was reached without incident on the 10th of the following month.

To fully appreciate the picture of Ormus thus presented to view, it should be studied side by side with the illustrations to a paper by Captain A. W. Stiffe, I.N., which appeared in the *Geographical Magazine* for April, 1874. This valuable article gives not only a summary of the history of the island, particularly of the siege of 1622, but also an interesting account of its condition at the time of the writer's visit in 1873. The illustrations include a sketch of the fort and landing-place, a careful plan of the north end of the island, a general map of Ormus and the neighbouring coasts, and a very quaint bird's-eye view of the town from Astley's 'Collection of Voyages.'

With the aid of these, the principal points in Davies's drawing are easily identified. Starting from the left, we at once recognize the castle, standing at the extremity of the neck of land on which the town is situated. Next is the bridge leading over the moat which defended the fortress on its landward side. A little further on is a tall column, marked by Davies as the "church," really a brick minaret, seventy feet high, and coated with glazed tiles, which was still standing, though in a tottering condition, at the time of Captain Stiffe's visit; the mosque to which it originally belonged is said to have been destroyed by the Portuguese as being too near the castle. Round this minaret cluster the remains of the town. In the background are seen the precipitous peaks of a range of salt hills; and on the summit of the highest of these is a chapel ("monastery," Davies calls it), with a zigzag road leading up to it. At a lower level is apparently indicated a "salt vein," a feature of the island specially mentioned by Captain Stiffe, who describes the valleys as thickly encrusted with salt washed down from the hills. On the shore to the right are shown several water-cisterns, now for the most part choked with earth, and utilized for raising small crops of vegetables, etc. In front of these a number of dots indicate the presence of a sandbank, and the soundings in the roads before the town are carefully given. The writing above and below the sketch consists partly of nautical directions for safe anchorage, and partly of the continuation of the writer's journal.

Such are the main features of this interesting old drawing. Of David Davies himself little or nothing is known. Only his log-book survives, written in the queerest spelling, and illustrated by a few rough sketches, of which the present, and the one previously published, are the most important. And one may note, in conclusion, that these two drawings form a link between two island cities of the same sea whose destinies have been curiously reversed—Ormus, which was once a great commercial centre, and to-day is nothing: and Bombay, then an obscure Portuguese settlement, and now a city whose wealth and magnificence are famous throughout the world.

THE LANDSLIP AT GOHNA, IN BRITISH GARWHAL.*

THE Bireh-ganga, a small stream following a westerly course for some 20 miles, joins the Alaknanda—the main branch of the Ganges—at a point about 150 miles from Hardwar, and some 3500 feet above sea-level. Its bed lies at the bottom of a narrow valley, whose sides, everywhere very steep and in places precipitous, are partially cultivated at places along the lower levels, and covered with forest chiefly composed of evergreen oak and rhododendron higher up. The mountains that flank the valley rise to 12,000 and 15,000 feet above the sea-level, and the river-basin covers some 180 square miles. The accompanying sketch-map (Fig. 1) shows the general topography of the district. To the east, Trisúl and other snow-clad peaks rise to over 20,000 feet, and supply a large portion of the waters of the Bireh-ganga during the warmer months. The dip of the strata of the dolomitic rocks, chiefly in a south-easterly direction, is in many places greater than their natural angle of repose; and the loosening of the strata by erosive agents has been recently followed by falls of immense masses of *débris* into the bed of the stream, damming it back and forming an extensive lake. Some years ago such a similar lake was formed on this river, some 16 miles above its junction with the Alaknanda. This lake, known as the Gudyar Tal, was entirely filled up by a later slip during the rains of 1869, and the water then forced over the dam caused disastrous flooding for miles down the valley. The landslips to the effects of which attention is now directed took place two or three years ago; the largest of them was that of September 22, 1893, at a point 8 miles from the junction of the Bireh-ganga, near a village of the name of Gohna, which narrowly escaped total destruction. The summit of the spur of a hill 4000 feet above the right bank of the stream slipped down into the bed, leaving a perpendicular cliff, and forming a barrier across the gorge over 800 feet in height. Falling continued for several days with a terrific noise, darkening the sky with dust. The rocks at first did not merely slip, but were shot forward with terrific force; some blocks hurled a mile away against the opposite cliff knocked down numbers of trees. Above the barrier a lake has gradually formed by the impounding of the streams. In order to ascertain the probable date of the water reaching the top of the barrier, and the effects it is likely to produce thereafter, careful surveys of the ground have been made. A plan of the lake on December 14, 1893, and various data as to drainage areas and rainfall, are given in Fig. 2. This shows the horizontal extent of the *débris* of the landslip as it lies on the valley floor. In December, 1893, Lieut.-Colonel R. R. Pulford, R.E., Superintending Engineer of the Lucknow Circle, assisted by Mr. Joseph, Divisional Engineer of Kumaon, and by Mr. Wildeblood, District Engineer of Almora, made a full examination of the slip; and Lieut.-Colonel Pulford's report to the Hon. J. G. H. Glass, C.I.E., Chief Engineer of the Buildings and Roads and Railway Branches, gives very complete topographical information. We compile the following notes from this report and other sources:—

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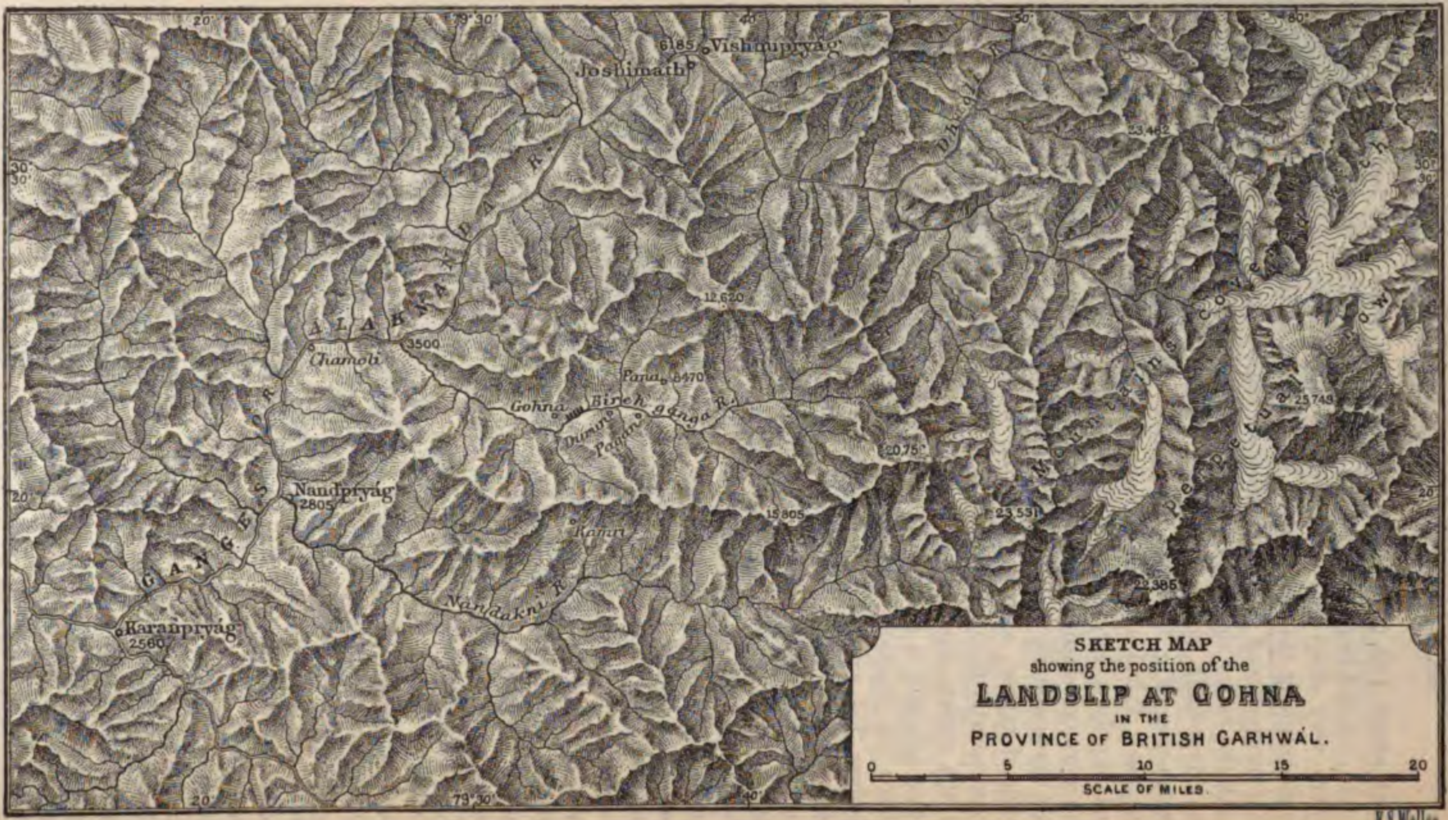
* The reports on which this article is based have been communicated to the Society by General R. Strachey, by permission of the Secretary of State for India.

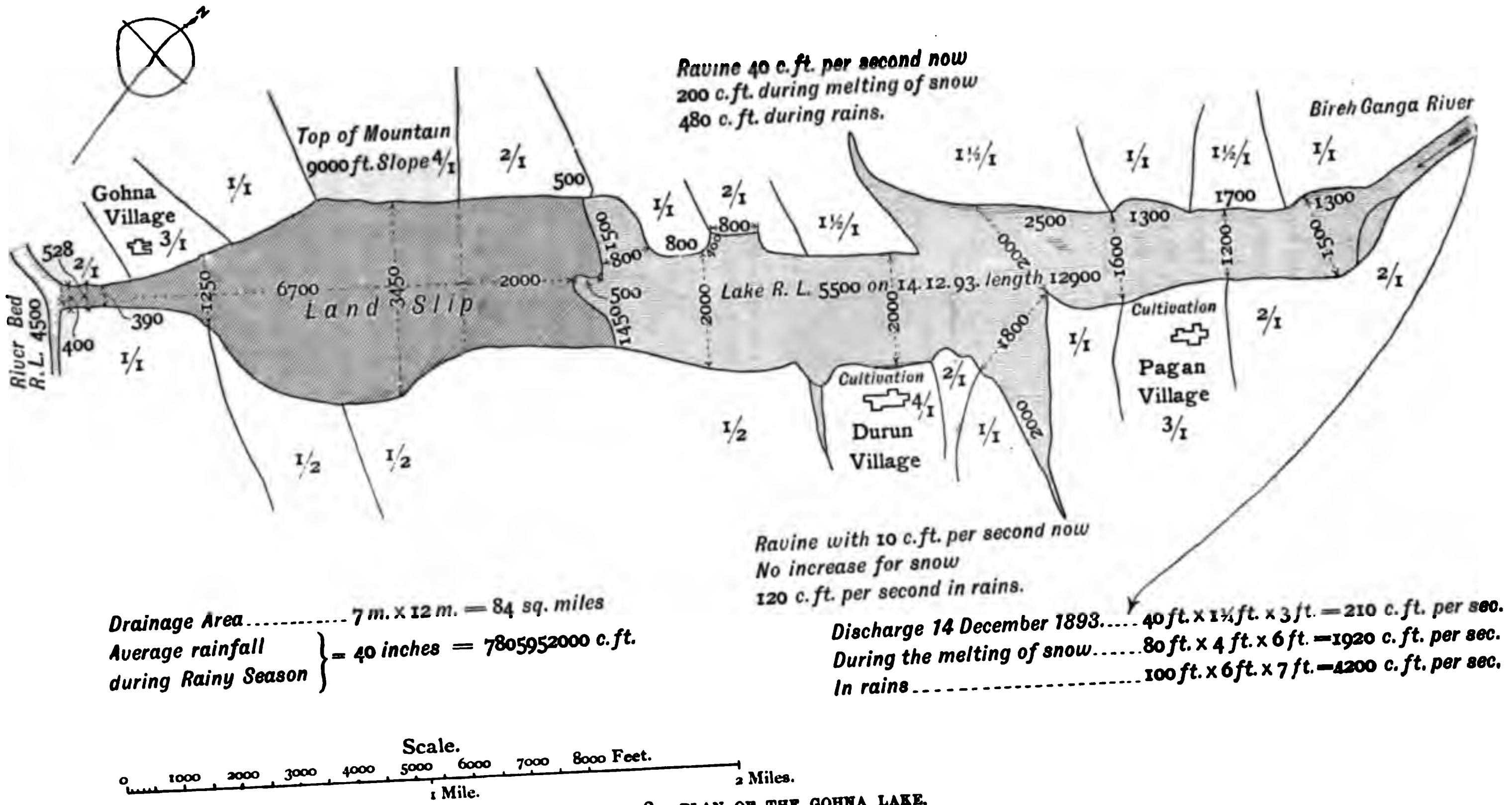


SKETCH MAP
showing the position of the

LANDSLIP AT GOHNA

IN THE
PROVINCE OF BRITISH GARHWÁL.

F. S. Weller.



Ravine 40 c.ft. per second now
200 c.ft. *during melting of snow*
480 *c.ft. during rains.*

Ravine with **10** *c.ft. per second now*
No increase for snow
120 *c.ft. per second in rains.*

Drainage Area .... *7 m.* × *12 m.* = 84 *sq. miles*
Average rainfall during Rainy Season } = **40** *inches* = **7805952000** *c.ft.*

Discharge 14 December 1893..... **40** *ft.* × **1¼** *ft.* × **3** *ft.* = **210** *c.ft. per sec.*
During the melting of snow...... **80** *ft.* × **4** *ft.* × **6** *ft.* = **1920** *c.ft. per sec.*
In rains..................... **100** *ft.* × **6** *ft.* × **7** *ft.* = **4200** *c.ft. per sec.*

FIG. 2.—PLAN OF THE GOHNA LAKE.

The force of the fall from so great a height as 4000 feet carried the rocks and *débris* from the right bank right across the valley of the river and halfway up the steeply scarped hill on the left bank; then, its energy expended, the mass slipped down again into the bed of the river forming a dam and a big slope up against the hill on the left bank. The consequence is that it now appears as though a portion of the dam had been formed by a slip from the steeply scarped hill on the left bank. The further slips of October, 1893, have piled up the dam on the right bank against the hill on that side, so that the top of the dam has a large depression in the centre, of 150 feet or more, between two sloping mounds of rocks and *débris*, as shown in the cross-section (Fig. 3).

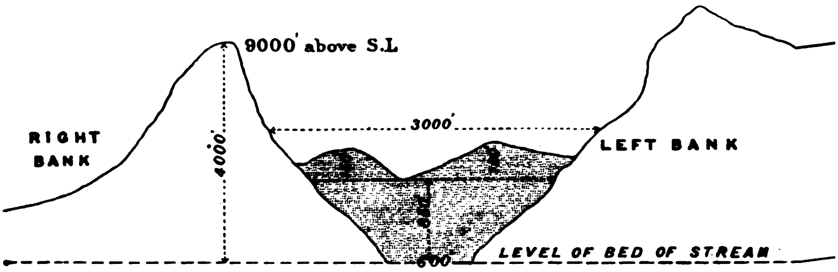


FIG. 3.—CROSS-SECTION OF LANDSLIP. THE SHADED PART SHOWS THE DAM FORMED ACROSS THE VALLEY.

The dam itself is a very massive affair, as can be seen from the plan and longitudinal section shown in Fig. 4. It is largely composed of enormous masses of rock, some of them calculated to be more than 1000 tons in weight. There is also a very large admixture of detritus from broken rock, and a thick layer of impalpable powder. The small stuff in the dam would, of course, be easily and quickly washed away by water passing over the surface. The rains of October, 1893, show a good example of this, as they have scoured out deep gullies on the outer slope. At the same time, these gullies serve to emphasize the fact that the main body of the dam is built up of large masses of rock, which would be likely to form a solid resistance to the action of water passing over it. The dam may be taken to be roughly 900 feet high, 2000 feet across at the top and 11,000 feet at the base along the valley, and 3000 feet at the top and 600 feet at the bottom across the valley. The bed of the river has a slope of about 250 feet in the mile, and, calculating from the section, the maximum depth of water in the lake formed on December 13 and 14, 1893, was 450 feet. The rate at which the water was rising during the time Lieut.-Colonel Pulford was there was 8 inches per day; but this was at the slackest

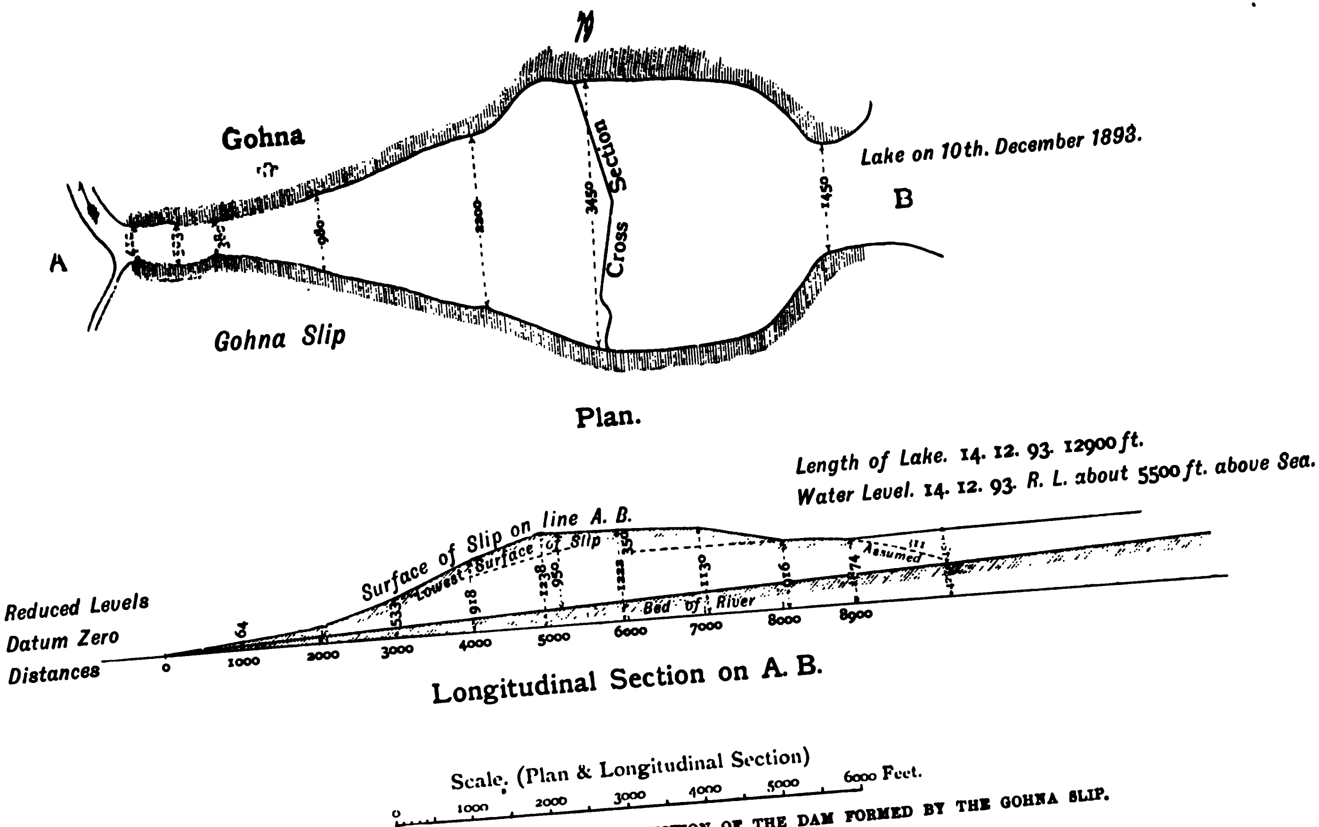


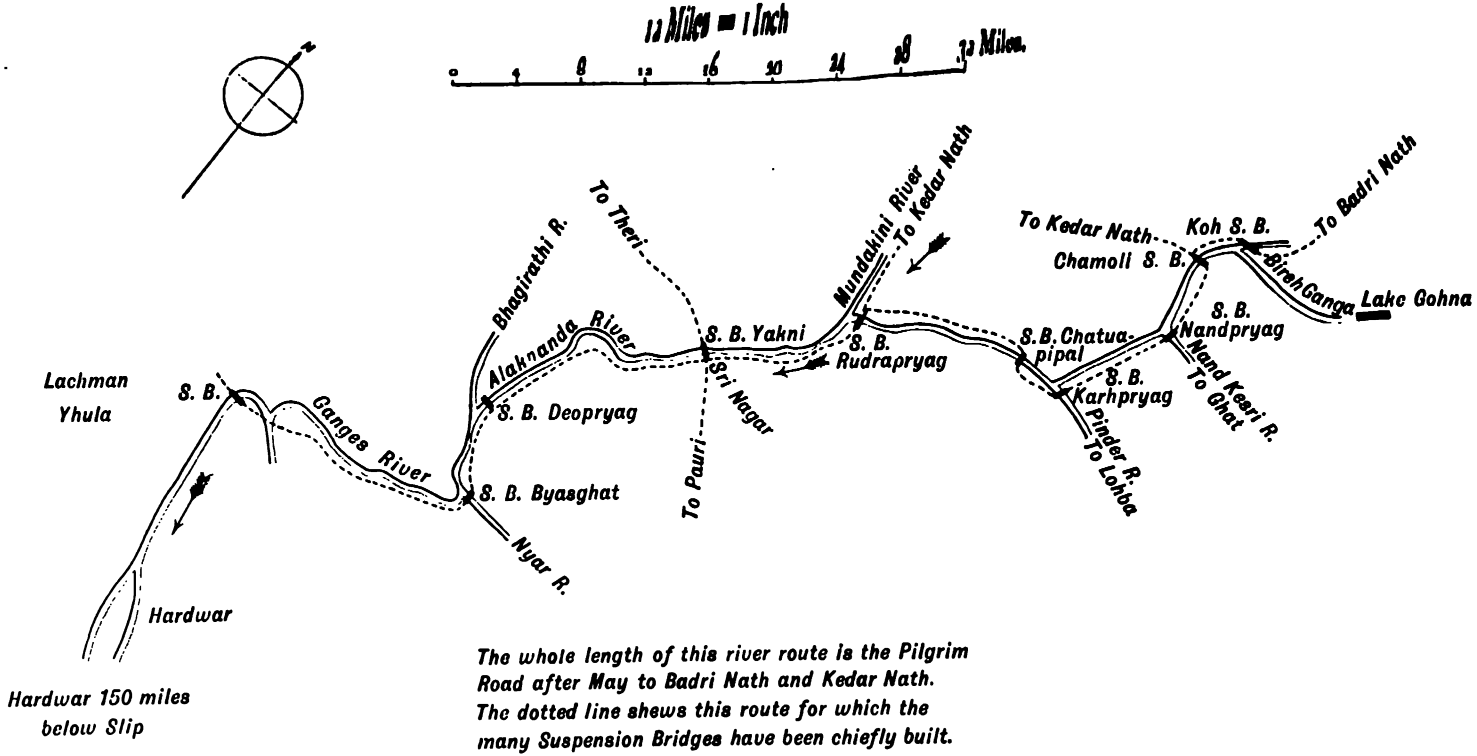
FIG. 4.—PLAN AND LONGITUDINAL SECTION OF THE DAM FORMED BY THE GOHNA SLIP.

time of the year in regard to the flow of water in mountain rivers. During the winter rains there is a large increase in the supply of water entering the basin drained by the Bireh-ganga; and during April, 1894, the snows beginning to melt would furnish a further large increase in the water impounded. Taking these several sources of additional supply into account, it should require forty-eight days after April 1, 1894, for the lake-water to rise to the top of the dam. In March the rate of rise was only 6 inches per day, and in the beginning of May the lake was still 265 feet below the top of the dam, the greatest depth as sounded by Lieut. Crookshank being 512 feet. The first rush of water passing over the barrier will necessarily be very severe, and probably at least 250 feet or so of the dam at the top will gradually be carried away. After that, it may possibly happen that the main portion of the dam will get thoroughly jammed and consolidated together, so as to form a permanent lake with a natural outfall over the broken rocks. In any case, there will be a terrific rush of water to be provided against when the lake tops the dam. So far as Lieut.-Colonel Pulford could see, the size of the dam and lake made it practically impossible to do anything in the way of letting off the water under control. The only thing which could be done was to ensure that the water would escape down the river-bed without loss of life, and with as little damage as possible to Government and private property. The bridges and villages menaced by the flood if the lake should break through its barrier are shown in detail on the plan in Fig. 5.

A meeting of engineers was held at Lucknow in January, 1894, to discuss the measures to be taken in connection with the landslip; and a note of instructions to Lieut. Crookshank, R.E., who had been ordered to proceed to the spot, was approved. Lieut. Crookshank was required to make a complete survey of the lake, dam, and valley, with contours at every 25 feet of vertical height. Bench-marks were to be erected at 10-feet vertical intervals, and the rise of water constantly noted and reported by a telegraph line to be laid up the valley from Hardwar. A skilled photographer was attached to Lieut. Crookshank, so as to secure a complete record of all changes up to and after the time of the overflow.

To prevent loss of life and damage to property, the civil authorities were to be kept fully informed of the progress of events; precautions were to be taken to preserve bridges crossing the valley between Gohna and Hardwar; and the pilgrim route near the Alaknanda, which is so much frequented during May and June, was to be closed as far as possible.

Mr. T. H. Holland, of the Indian Geological Survey, examined the ground in February and March last, and, while adding many important



The whole length of this river route is the Pilgrim Road after May to Badri Nath and Kedar Nath. The dotted line shews this route for which the many Suspension Bridges have been chiefly built.

FIG. 5.—PLAN OF RIVER BELOW THE LAKE, SHOWING PROBABLE DANGER DURING FLOOD TO BRIDGES AND TOWNS.

geological facts, confirmed the conclusions arrived at by the engineers. Mr. Holland expected that the lake would begin to overflow about the middle of August, and made a somewhat lower estimate of the rapid erosion likely to follow the first overflow than did Lieut.-Colonel Pulford. He points out that the great size of the newly formed lake is in itself a safeguard against its sudden filling up by further landslips and consequent repetition of the floods of 1869. In his report published in vol. xxvii. pt. 2 of the *Records* of the Geological Survey of India, from which some of the facts stated above have been taken, he shows that fears entertained for the stability of the great mass of the dam are groundless. At its weakest point the resistance offered by the dam is nearly twenty-nine times the horizontal pressure of the water brought to bear on it (14,000 tons). The angle of repose of the dolomitic talus on the dam is about 40°, so that a section would require about four-fifths of its own weight to move it, supposing it to offer no resistance due to friction against the sides. The weakest section of the dam has therefore at least twenty-three times the necessary strength, and this estimate would be greatly increased by taking into account the weight of the innumerable dolomitic blocks on either side of the point of overflow.[*]

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[*] In connection with this subject, the following telegram from the Calcutta correspondent of the *Times*, under date July 10, is of interest: "Since the beginning of the rainy season the water of the Gohna lake has been rising about 2 feet daily, and is now 160 feet from the top of the dam. As percolation has begun through the dam, and is increasing with the increased pressure, the date of the overflow will probably not be before the middle of September, but as the dam seems to be composed of large blocks of dolomite to within a few feet of the top, a sudden flood or overflow is not anticipated. Nevertheless, careful precautions have been taken to ensure the safety of the inhabitants of the valley below by placing marks at three different levels above the river-bed, the highest level being the safety-line of retreat for a *maximum* flood. The villagers will be warned by telegraph from the lake of the nature of the flood, and due notice will be given as the water approaches the top. All who have visited the spot agree in thinking that there will be in any case a permanent lake more than three and a half miles long." On July 23 the lake was still 131 feet below the level of the dam, which was reported to be completely saturated.

THE MONTHLY RECORD.

THE SOCIETY.

The Society's Premises.—The Society's rooms will be closed during the months of August and September, in order to carry out certain alterations which the Council have decided are necessary for the accommodation of the rapidly growing collections of the Society, and the convenience of the increasing number of Fellows who make use of the rooms for reading and research. It was hoped that it might be possible to remove to larger premises, but this has been considered impracticable in the meantime. The electric light will be introduced, increased library and map accommodation will be provided, and arrangements made whereby the comfort of those who frequent the Society for reading and study will be secured.

The New Lecturer on Geography at Manchester.—With the approval of the Councils of the Royal Geographical Society and of the Manchester Geographical Society, Mr. Andrew J. Herbertson, Edinburgh, has been appointed lecturer on Geography at Owens College, in succession to Mr. Yule Oldham. Mr. Herbertson has studied Geography in a very thorough manner, commencing by a practical training in surveying, and afterwards attending lectures on Geography and collateral sciences at the Universities of Edinburgh, Freiburg, Montpellier, and Paris. He has done practical work in botanical distribution, meteorology, and oceanography.

EUROPE.

Geographical Research in the Central-European States.[*]—While in almost all the exterior countries of our continent the main interest of geography is concentrated on distant lands, and the wealth of material which is brought together by the labours of State departments (geological, topographical, statistical, meteorological, hydrographical, and historical) in the exploration of the country itself remains for the most part not worked up, in the heart of Europe, *i.e.* in Germany, a movement was set on foot during the eighties which has for its aim the systematic advancement of scientific *Heimatskunde.* The "Central Commission for the scientific geography of Germany," which at present (since the retirement of Kirchhoff of Halle) is under the direction of Penck of Vienna, has, during the twelve years of its existence, published a series of works devoted to the carrying out of the great work laid down. Thus among others the *Forschungen zur deutschen Landes und Volkskunde* (edited by Kirchhoff in the name of the Commission) has reached its forty-first part (vol. viii. part 2), whilst the latest addition to the *Handbücher z. d. L. u. Volkskunde* is the recently completed first volume of R. Lepsius' 'Geology of Germany and the neighbouring regions.' The principal attention of the Commission is directed, however, now as at the outset of its work, towards opening up the literature of local geography by the compilation of a great 'Bibliotheca Geographica Germaniæ,' which has been entrusted to P. Richter, of Dresden. Among the materials for this great work are the geographical and ethnological bibliographies of separate German states and provinces, of which those of the provinces of East and West Prussia, and of Silesia, have been the latest to appear. It is this line of activity on the part of the German commission which has now found special favour and imitation in the adjoining countries which are allied to the German Empire by language or race. Thus not only is the publication of geographical bibliographies for almost all the crown territories of Austria meditated, but the same is the case in Switzerland, where several parts of the 'Bibliography of Swiss Geography,' compiled by Graf of Berne have already appeared; and in the Netherlands, where the 'General Geographical Bibliography of the Netherlands' has already been brought to a conclusion. The latest phase of this whole movement is the change, already inaugurated at the last German "Geographentagen" (Vienna-Stuttgart) of the "Central Commission" into an "Association for German Geography," and also the proposed founding of an independent "Association for the Scientific Geography of Austria," which to all appearance is still nearer realization, and for the funds of which a considerabl amount has already been set apart by Government.

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[*] By Dr. K. Peucker, of Vienna.

Periodical Variations of the Glaciers of the Alps.—The report for 189 by Professor Forel on this subject, appears in the *Jahrbuch* of the Swiss Alpin Club for 1892–3 (p. 285). It begins with some notes on the inundations caused by glacial catastrophes, which have an important bearing on the subject, as such catastrophes often occur at the times of the maximum advance of glaciers. With regard to that of St. Gervais in Savoy, Forel doubts the explanation which attributed it to the presence of an internal lake formed by the melting of the sides of one or several crevasses, on the ground of the small power of enlarging a cavity possessed by stagnant water within a glacier. He is inclined to suppose that the accumulation of water was due to the falling in of the roof of a tunnel through which a glacial torrent flowed. This explanation avoids the necessity for supposing a variation of the phase of advance, now constant for all the glaciers of the *Massif* of Mont Blanc. Attention is next called to the definition by Professor Richter, of Graz, from a study of the Tyrolese archives, of the dates of catastrophes connected with the glaciers of Vernagt and Gurgl, which will be also those of maximum advance. Details are then given as to the increase or decrease of individual glaciers in Switzerland and neighbouring parts of the Alps, the result of which is to show that since the previous report three more glaciers had proved to be increasing, bringing the total to 57 or 58. The general result is—Massif of Mont Blanc, al increasing; Alps of Valais, a good half increasing; Bernese Alps, some increasing Alps of Uri, Glarus, and Grisons, all decreasing or stationary. By a series of maps Forel shows the gradual increase in the number of those advancing in the Swis Alps and the Massif of Mont Blanc since 1875. In that year there was one only in 1880, 12; in 1885, about 30; and in 1890, about 50.

River Fleet of European Russia.—The following little table gives a go idea of the growth of the steam fleet on the rivers of Russia during the last eig years. It gives the number of steamers in each of the river basins of Europe Russia:—

	Steamers.			Steamers.	
	1885	1893		1885	1
Volga	724	1010	Narva, Luga and lakes	14	
Dnieper	135	218	N. Dvina	46	
Don	92	138	Niemen	13	
Dniester	5	14	Vistula	21	
W. Duna	42	63			
Neva and lakes	187	207	Total	1279	17

Of these, 1217 were (in 1893) tug and passengers' steamers.

ASIA.

Mrs. Bishop in Korea.—A letter has been received from Mrs. Bishop, describing the progress of her journey in Korea. Mrs. Bishop arrived in Korea at t end of February. After spending some weeks in Seoul, she hired a sampan and ascended the river Han from Seoul, where tide-water ends, to Yang-chyen, less than 50 miles from the east coast, where she was prevented by a rapid from proceeding further. The river is very difficult of navigation owing to the number of rapids. In her letter Mrs. Bishop informs us of her intention to send by the same mail a set of notes on the south branch of the Han, including a description of the country traversed, copies of her itinerary on the river, and of a sketch-map of the route, correcting the errors of the Japanese and Mr. Satow's maps. But, unfortunately, a postscript dated from Mang-chyen (?), north branch Han river, informs us that in running a rapid in a storm her boat was nearly swamped, and all the papers were lost. Having ascended this river as far as practicable, Mrs. Bishop next intends to proceed to Wonsan, a three weeks' journey, taking in part Mr. Campbell's route through the Diamond mountains.

Roborovsky's Expedition to Central Asia.—Details respecting the earlier stages of Captain Roborovsky's expedition in Central Asia, the arrival of which at the Sa-chu oasis was announced in the July *Journal*, are published in *Petermanns Mitteilungen*, 1894, p. 106. From the neighbourhood of the Issyk-kul, the expedition took a route parallel to, but south of, that of Prjevalsky in 1876, proceeding first down the valley of the Tekes, one of the head-streams of the Ili, the Kalmuck inhabitants of which live mainly by hunting and cattle-rearing, some barley and millet, however, being raised. The Kok-su, an important tributary of the Tekes from the south-east, was next ascended, the route, however, deviating from the stream and passing through a mountainous country, with glaciers and snowy ridges and streams flowing in narrow valleys, much of the rock being conglomerate. A change was noticed in the vegetation as the expedition advanced eastward, the forests of firs, which were at first seen, ceasing after a time. The Karagai-tasnin-daban, which divides the Kok-su from the Chaidik-gol (the stream which flows through the greater Yuldus valley into the Bagrach-kul), is a gently sloping ridge with swamp vegetation. The greater and lesser Yuldus valleys were once occupied by an Alpine lake, whose waters have been drained through a narrow ravine with perpendicular sides, the stream flowing at a level almost 5000 feet below that of the surrounding country. The inhabitants are Tongut Mongols, who came from the Volga two hundred years ago, and live in complete isolation. Below the ravine the valley opens, the stream branching much and forming wooded islands. In its lower part it is everywhere fruitful, but abounds with ruins, the result of the Dungan rebellion. The route next led to the river Algo across the northern mountains, the passage of which was easy. They are covered with wood and pasture, with large poplars, cork-elms, and willows in the valleys. The Algo flows in a deep valley of varying width, with poplars, willows, roses, and other bushes. Animal life is varied; cattle abound, and some cultivation is carried on by the Tonguts. Proceeding downwards, the level sinks until the depression of Lukchun, discovered by the brothers Grijmailo, is reached. The preliminary observations showed that the level is even lower than they supposed, the surface of the salt-lake Bodshaite being over 980 feet below the sea. The northern and western parts are fairly fertile, with irrigation, and here the population is congregated, consisting chiefly of Mohammedans of Turkish origin and speech, who cultivate corn, cotton, tobacco, vegetables, and fruit-trees. Several deviations from the above route were made by Lieut. Kozloff, the second in command, in order to extend the surveys over a wider area of country. The first was an excursion across the mountains which bound the Yuldus valley to the south, to the oasis of Bugur, on the road between Kuchar and Kurla. The ascent and descent were extremely steep, the summit ridge wild and rocky, reaching a height of 14,000 feet above the sea. During the descent the country becam more and more picturesque and the vegetation richer. The Bugur oasis (popu lation 2320, the majority Sarts) resembles the others along the Tian Shan. I the shops the majority of the goods were Russian, but some also English. Kozlo also examined the country at the source of the Algo, where are several small lake and from Toksun, west of the Lukchun depression, made a preliminary journe southwards towards Lob-Nor, the direction afterwards taken by the whole e pedition. As found by the brothers Grijmailo, who advanced a considerabl distance in this direction, the whole country is traversed by mountains, whic enclose level depressions, some with a considerable amount of vegetation. Tl fertile oasis of Kisil-Sinur, Kozloff's furthest point, was discovered by a hunter fro Toksun. Wild camels are found in the vicinity. The latest news received fro Captain Roborovsky is from the oasis of Sa-chu. It is a short letter, dated May 1 transmitted by telegraph from Kulja on July 7, and published in the *Official Me senger*. This letter supplements the information given above. Captain Roborovsk writes, "By three excursions undertaken from Sa-chu the expedition has explored f 300 miles the northern borders of the Nian-Shan system, and for 175 miles its souther slope, west of the Sa-chu meridian, where we have crossed the range and visite the lakes of north-west Tsaidam-Khuntei, Khuitun, Sukhain, and Bulunghir, th positions of which, as well as that of the main range, are different from those give on the map. The Su-lei-khe river has been followed for 200 miles, from the mou tains to its entrance into Lake Khalachi. The wild Kuruk tagh range has bee crossed in a north-western direction. Altogether we have surveyed 1000 mile The meteorological observations have been made regularly for four and a half month We have also observed the coming of the spring in both the oasis and the moun tains, the migrations of birds, the development of the flora, etc. The collectio have received considerable additions. On May 22 the expedition will leave th oasis to explore the Nian-Shan system in the east, as far as Lake Koko-Nor. Pa of the luggage will be left at Sa-chu. All well."

Dr. Sven Hedin's Expedition in Central Asia.—Dr. Sven Hedin writ from Kashgar on June 11, with reference to the note in the January number o the *Journal* (vol. iii. p. 58), in which the statement that he was attempting t reach Lhassa in the disguise of a Persian merchant was quoted from the *Verhand lungen* of the Berlin Geographical Society. Dr. Hedin gives the following accoun of his work and plans. After crossing the Pamirs from Marghilan to Murgab an Bulun-kul, he reached Kashgar on May 1. On the way he had made man interesting observations, an account of which, from a Russian source, was publishe in the *Journal* for July (vol. iii. p. 62). Besides important observations on th winter climate of the Pamirs, these included a study of the frozen Kara-kul and o the glaciers of Mustag-ata, which was ascended to an elevation of 18,000 feet. A attack of inflammation of the eyes compelled the explorer to seek the comforts o Kashgar, but at the date of writing he was preparing to return to the Mustag-ata and make a thorough study of the mountains from Tagarma to Kissil-su from th geological point of view. A topographical map of the route will also be made an particular attention paid to glacial phenomena, including the dimensions an movements of glaciers, the height of the snow-line, and the extent of the névé This work may occupy two months, after which Dr. Hedin intends to return t Kashgar and prepare for an expedition to Lob-Nor, following the course of th Tarim, when observations will be specially made on the deserts and the moveme of the sand. At the beginning of next year he proposes to visit the Taghdumbas Pamir, and, if permission can be obtained from the Indian authorities, proceed b Kanjut (Hunza) to Leh, where a caravan would be organized for a journey in

Tibet. On this expedition the route of Nain Singh would be followed pretty closely, and proceeding by the Nan-Shan, Alishan, and Ordos, the journey would end at Pekin. Should it be found practicable to visit Lhassa, an attempt would certainly be made to do so, only there is no question of going disguised as a Persian merchant, but simply as a European, and well armed. Dr. Sven Hedin is kind enough to promise a further account of his travels in Central Asia on his return to Kashgar. Much valuable information must certainly result from his prolonged study of the natural conditions of the most interesting regions which he intends to visit.

Survey of Aden.—We have received a communication regarding the notice of the survey of Aden, which appeared at the end of the article on "The Surveys of India, 1891–92," in the *Geographical Journal* for August, 1892, p. 154, calling attention to the fact that the survey had actually been carried out by Mr. G. P. Tate, Government surveyor, Quetta, whose "unremitting energy and zeal" in the work has been officially recognized. His name should therefore have been mentioned with that of Major Wahab.

AFRICA.

French Exploration in Madagascar.—In the *Bulletin* of the Paris Geographical Society (1893, part 3), M. Alfred Grandidier gives a sketch of the exploring work done by French travellers in Madagascar during the last thirty years, accompanied by four large-scale maps embracing the greater part of the island, in which all their itineraries are laid down, and numerous sections of the country along the routes given. M. Grandidier's own surveys, carried out between 1865 and 1870, by which the orographical system of the island was for the first time brought to light, form the most important contribution to the map, and since that time he has been in correspondence with many travellers, who have communicated to him the results of their surveys, which are now published in a collected form. The greater number of the itineraries naturally converge on the capital, and the north-eastern sheet which contains this is the most closely filled in. The remainder occur principally in the south-east, and in a band across the island a little below the centre, so that the extreme north, north-west, and south-west are the only parts not dealt with. Besides M. Grandidier's surveys, the chief are those of Roblet, Gautier, Foucart, Catat and Maistre, Authonard, Douliot, and Besson. The work of explorers of other nations (Mullens, Sibree, Deans Cowan, etc.) is not inserted, though its value in the interest of geography is acknowledged. In the same publication M. Grandidier also publishes the notes of the journeys made by MM. Besson and Douliot in 1891. The former gives an interesting account of a visit to the stronghold of the independent Tanala, who inhabit the forest track east of the escarpment of the central mountains. As related by Mr. Deans Cowan in his paper published in the R.G.S. *Proceedings* for 1882, the retreat afforded by the almost inaccessible mountain of Ikongo has enabled a section of this tribe, under their chief Ratsiandraofana, to resist all the attempts of the Hovas to subjugate them. The Tanala are exceedingly distrustful of strangers, and it was only at the third attempt, after long cultivation of friendly relations by presents, etc., and finally by submitting to the ceremony of blood brotherhood, that Dr. Besson was allowed to ascend the mountain. As far as the village of Andrainoarivo, where the king was then living, the slope is about 45°. From this to the top it became nearly vertical, the path being encumbered by rocks and hidden beneath brushwood. The summit, an elevated plateau 5 or 6 miles long, is covered with thick brushwood, among which are the remains of the former village, now abandoned. There is a thick covering of soil, and most crops might be cultivated, except rice, for which the cold is too great. The tribe was formerly disunited, but was brought under a sort of patriarchal rule by the present king (now quite an old man), after his escape from slavery among the Betsileo. Their social life is primitive, but conforms to natural law, theft being unknown and drunkenness rare.

French Travellers in the Sahara.—The attention of French travellers has of late been turned to the west no less than to the north of the Sahara. The kingdom of Adrar was not long since the objective of the journey of M. Fabert, who, however, was obliged to return to St. Louis without attaining his object. We now learn (C. R., Paris Geo. Soc., 1894, p. 209) that M. Gaston Donnet is making the same attempt, intending if possible to continue his journey northwards as far as Tendub, to the south of Morocco. The opposition of the King of Adrar, who refused to allow M. Fabert to enter his kingdom, is likely to be the chief difficulty in his way. The proposed route is much the same as that taken in 1850 by Panet, when first the idea of establishing a connection between the Senegal and Algeria was taking shape in France, Morocco being, as it turned out, the goal of his journey also. No European traveller, we believe, has visited the capital of Adrar since his day. Another French traveller, M. G. Debrel, has lately visited the oasis of Tafilelt, in South Morocco, which had only twice before been reached by Europeans (*Pet. Mitt.*, 1894, p. 143).

Journeys in French Congo.—In the restless endeavour to open up routes into the far interior of Africa, it often happens that intervening tracts nearer the coasts are long left unexamined. This has been the case in French Congo, in regard to which M. Dybowski, after returning from his expedition into the basin of the Shari, found that, owing to his rapid passage through the coast regions, it was just these about which he had collected the least information. He therefore determined on a new journey into the country between Loango and Libreville, in which the maps showed merely vague chains of mountains which had been seen from the sea. Starting from the neighbourhood of Loango (C. R., Paris Geo. Soc., 1894, p. 176), M. Dybowski, in a series of excursions between the coast stations and the interior, reaching to about 60 miles inland, made a careful examination of the country and its inhabitants, among whom are the little-known N'komi, and the Okoa, a race of small stature (not exceeding 4 feet 7 inches), yellowish in colour, with light, reddish-brown, woolly hair. They are good hunters, and make sturdy porters. Live specimens of the chimpanzee and gorilla were obtained, but have since died. The extensive collections brought home should yield good results when examined and classified. Our knowledge of the parts of French Congo off the usual routes has also been added to by the journey of M. Barrat, commissioned by government to examine the geology of the country, overland from Franceville on the upper, to Njolé on the middle Ogowé, and thence over the Monts de Crystal to Libreville.

Baron v. Schele's Journey in East Africa.—By the journey of Baron v. Schele to Lake Nyasa, and thence by a direct route to Kihsa (November, 1893, to March, 1894), a condensed report of which appears in the *Deutsches Kolonialblatt* for May 1, the last blank of any great extent has disappeared from the map of German East Africa. The chief objects of the expedition were, firstly, the discovery of the best line of communication between the newly founded station of Langenburg on Lake Nyasa and the coast; and, secondly, the suppression of the raids of the Mafiti and Magwangwara (under the chiefs Shabruma and Mpepo) between the Rufiji and Rovuma, which had devastated districts of the Ulanga and up to the very doors of Kilwa, and caused a great decrease of trade. The outward route led across the Ulanga, explored in 1885 by Count Pfeil, and from its head-stream across a strip of the central plateau to Lake Nyasa, the passage of the bounding ranges on the east, and of the Livingstone Range on the side of the lake, being excessively difficult. On the way a band of Mpepo's people, 600 strong, was encountered and routed by a detachment under Captain Ramsay; the Mafiti chiefs on the Ulanga were also visited, and severe penalties inflicted on those guilty of raiding. Their country is well peopled, and agriculture is extensively practised, so that their predatory habits are not the outcome of want. The plateau is sparsely populated, probably owing to its exposure to raid; but the soil is fertile, and the rich succulent grasses resembled those of European meadows. The cattle-plague which has visited so many parts of Africa has raged here too, but the surviving cattle appeared strong and well fed. The climate being cool and pleasant, the country seems well suited for colonization. After some stay on the lake and a visit to the rich Konde country, the return journey was begun from Amelia Bay (the Wied Hafen of Wissmann, *Pet. Mitt.*, 1893, Map 14) in 10° 30′ S.L., the passage of the mountains being here very easy. The country as far as the Luwegu, the stream which joins the Ulanga at the Shuguli falls, is a gentle undulating plateau, extremely fertile, about 4000 feet above the sea, inhabited by the Magwangwara, who are great agriculturalists. The march led near the village of the chief Shabruma, but all efforts to induce him to come to a *Shauri* were effectual. Beyond the Luwegu the country is more steppe-like, though still about 3300 feet above the sea. Though not unfertile, it is uninhabited. Details as to the direction of the route are not given, nor is anything said as to the size of the Luwegu where crossed, or the position of the water-parting between the Rufiji and Rovuma basins; the publication of the results of Captain Ramsay's surveys will, therefore, be awaited with interest. This route from Amelia Bay to Kilwa is recommended as the best means of communication with the station on Lake Nyasa, the existence of which, together with the presence of the steamer H. v. Wissmann on the lake (it is larger than any of the English vessels), is said to have greatly benefited German influence. The two things still wanting, in the governor's opinion, are a steamer on Lake Tanganyika, and a line of custom-houses on the frontier, the trade being at present entirely in English hands.

POLAR REGIONS.

The Jackson-Harmsworth North Polar Expedition.—In another part of the *Journal* will be found a detailed account of the objects and equipments of this expedition. The *Windward* sailed from Greenhithe at one p.m. on July 11. Among those present to say farewell were Mr. Clements Markham, President of the Society, Admiral Sir Erasmus Ommanney, and Sir Allen Young. Mr. Harmsworth was also present to say farewell to the staff of an expedition which he has equipped so handsomely. Before the departure of the expedition the following letter was sent to Mr. Jackson by Mr. Markham :—

"MY DEAR MR. JACKSON,

"I cannot let you leave England without wishing you all possible success in the glorious, but most arduous enterprise which you have undertaken. You have the great advantage of having received munificent and unstinting aid in the equipment of the expedition, and I make no doubt that you will be fortunate in your companions. Still, everything must depend on yourself, and the command of such an expedition is no light matter when its object is to achieve so great a success. In your hands, for the time, is the Arctic fame. Your country and I feel sure that you will rise to the high level of your great undertaking and worthily uphold British credit and renown. Accept my most heartfelt wishes for your well-being, for your success, and for your safe return.

"Yours very sincerely,

"CLEMENTS R. MARKHAM."

We can only wish the expedition the most complete success.

The Wellman Arctic Expedition.—Mr. Walter Wellman's expedition to the Arctic regions *viâ* Spitzbergen, left Tromsoe on May 1, 1894, in the steamer *Ragnvald Jarl*, with the purpose of making "a dash for the pole" along Parry's line of advance in 1827 (see vol. iii. p. 335). The President of the Royal Geographical Society received a telegram from Colonel Feilden and Captain Townley Parker dated from Tromsoe on July 12, giving the first definite information as to the progress of the expedition, and unfortunately the news is far from reassuring as to the prospect of ultimate success. The steam-yacht *Saide* of the Royal Yacht Squadron reached Spitzbergen, and on July 6 communicated with Danes Island, Mr. Wellman's base station. The geologist of the expedition, Professor Owen, was found there alone in charge of the house and stores. He reported that the *Ragnvald Jarl* had reached Danes Island on May 7, and, after landing a portion of the stores, left on May 10 for Seven Islands, promising to return about May 17 for Professor Owen. This is the latest news known up to July 6. The ship never returned, and the Norwegian walrus-hunters cruising off Verlegen Hook had seen nothing of her. In addition to the crew of nine men, Mr. Wellman and fifteen companions were on board the vessel when she left Danes Island, and it is possible that they may have landed on the ice and proceeded on their boat and sledge journey to the north in safety. There can be little doubt that the *Ragnvald Jarl* had been beset in the ice and probably lost. The *Saide* set out in search of the missing vessel or her crew, but was stopped by the pack ice north of Hakluyt's Headland in latitude 80° 10′, and after skirting the pack ice to Verlegen Hook without finding an opportunity of entering it, she had to return, as her coal was running short. Should Mr. Wellman and his party succeed in returning to Danes Island, there will only be enough provisions there to last the whole number of men three months. A telegram to the *Times* from Tromsoe supplements the information sent to the Society in a few particulars. The *Saide* met the experienced arctic whaler and sealer, Captain Johannssen, on July 8, who had been some distance north-east of Spitzbergen, and it was his intention to return to the north-east as soon as the ice permitted, in order to look for Mr. Wellman. In any case he hopes to bring home Professor Owen.

The Peary Relief Expedition.—The Peary Auxiliary Expedition sailed from St. John's, Newfoundland, on July 7, on board the steamer *Falcon*, for Inglefield Gulf, Greenland, to bring home Lieutenant Peary's party. They will call at Carey Island, where the Swedish naturalists Björling and Kallstenius were wrecked in the schooner *Ripple* in 1892, and will also search at Cape Faraday and Clarence Head to ascertain the fate of the naturalists. The party will explore Jones's Sound and make a chart of the coast, returning to Bowdoin Bay for Lieutenant Peary on September 1. The expedition is expected to return by September 20. Dr. Ohlin, the Swedish zoologist, Professor Chamberlin of Chicago University, and Professor W. Libbey of Princeton University, are members of the party, which is under the leadership of Mr. Bryant, Secretary of the Philadelphia Geographical Club.

GENERAL.

A New Geographical Society.—By its incorporation last year, the Geographical Club of Philadelphia, founded in 1891 by Professor Angelo Heilprin, has become practically a new geographical society, as its ordinary membership appears to be unlimited, and its objects are "the furtherance of the science of geography and the promotion of geographical studies generally." A medal, termed the Elisha Kent Kane Medal, is to be awarded annually for some piece of geographical research or exploration carried out in the two years preceding the award. The Board of Directors also have the power "to create honorary professorships of Political and Historical Geography, Physical and Descriptive Geography, Anthropogeography, Military and Naval Geography, and Cartographical and Topographical Geography." There is a periodical *Bulletin*, two numbers of which have been issued.

OBITUARY.

General Robert Maclagan, R.E.

General R. Maclagan, r.e., who died in London on April 22 last, was born in Edinburgh in 1820, and was the third son of Dr. David Maclagan, Physician to the Forces and Surgeon in Ordinary to the Queen for Scotland, another son is now Archbishop of York, and Professor Sir Douglas Maclagan of Edinburgh is a third. He was educated first at the High School and University of Edinburgh, and afterwards at Addiscombe, whence he passed with credit into the Bengal Engineers. He joined the head-quarters of the sappers and miners at Delhi in March, 1842, and in the following October was ordered to proceed to Firozpur, whither our victorious troops were then returning from their successful campaign in Afghanistan. After serving for some time as assistant to Sir William Baker in Kurnal, and for a brief period in 1845 as Executive Engineer of Karachi, we find Maclagan actively employed in the Sikh war, and entrusted with the measures for the defence of Lahore in case of attack, an event which fortunately did not come off. In 1847 he was appointed Principal of the new Civil Engineering College at Rurki. A visit to the United States in 1853, paid at the instance of the Government of India, enabled him to study the system of education there pursued, and led to the formation of several notable friendships. In the following year Maclagan obtained his captaincy, and the same year saw him married to Patricia, daughter of Patrick Gilmour, Esq., of Londonderry. On the outbreak of the Mutiny the Europeans had to be accommodated in the workshops at Rurki, where Maclagan was again employed. The force available for defence there consisted of about ninety Europeans, civil and military, all under the command of Major Baird Smith, until the latter was called to Delhi as chief engineer. The little garrison were cheered by various expedients: a gazette "for private circulation only" was started, the Queen's birthday was duly observed, and Divine service was never neglected. Of Maclagan at that time Mrs. Baird Smith writes, "His grand services, his resolution, his sleepless care for all, and his special tender care for all who were left most lonely, is hardly to be described." In 1861 he was promoted to be lieut.-colonel, and became chief engineer and secretary to the Punjab Government. Among various important works inaugurated during his tenure of office may be mentioned the Bari Doab Canal, while work was commenced on the Sirhind Canal, the Swat River Canal, and in the improvements of the western Jumna and other inundation canals. Railways were introduced into the province, and the formidable task of bridging the great rivers was taken in hand. The high-road from Delhi to Peshawur was partly laid down, and many minor roads, bridges, buildings, and other public works were brought to completion. General Maclagan retired in January, 1879. He became a Fellow of the Royal Geographical Society in 1871, and was for some years on the Council. He contributed scientific papers to various periodicals, among which may be mentioned one on the "River-basins of India," read before Section E of the British Association in 1885, at the Aberdeen meeting. In concert with Colonel Yule, he prepared a memoir of his old chief, Sir William Baker, which was printed for private circulation, and until recently he was engaged in writing a life of Akbar. General Maclagan was a man of active habits and strong, though tolerant religious views. He has left a widow, two daughters, and four sons, one of the latter being in his father's old corps, and one in the Bengal Civil Service.

CORRESPONDENCE.

Lord Dunmore's 'The Pamirs.'

Yokohama, Japan, May 10, 1894.

In the February number of the *Geographical Journal*, which, owing to my absence in the East, I have not yet received, but happened to read the other day at Shanghai, I noticed amongst the contents an unsigned article entitled 'Two Books on Central Asia.' I regret I was not at home at the time the article was published, for then I could have referred to my book, and should therefore have been in a better position to reply to the somewhat unfair strictures and not wholly accurate statements of the writer.

As I have no means of referring to my book, I must endeavour to reply as best I can from memory.

I take it for granted, of course, that the writer has travelled through the countries that I did my best to describe, and has also with his own eyes gazed upon all the scenes that I depicted, otherwise he could never have the face to say that some of my illustrations were good, "though the greater part can hardly be said to give a faithful representation of the scenes they are meant to depict."

The writer complains that although, in the preface of my book, I state that "it has no pretensions beyond being a faithful daily record of the wanderings of Major Roche and myself," etc., yet that I "frequently treat of matters that are usually considered to lie within the domain of the geographer," etc., and that "if the journey had been made over unknown ground and in a new country, we should have welcomed with gratitude Lord Dunmore's attempts to furnish us with some preliminary knowledge of the geography of the region he had visited."

In reply to this, I would ask the writer to furnish the names of any English travellers or explorers who have crossed the Chu-Chu Mountains and come down the Poskee River to Sanju.

Because I am not a "professional surveyor" and a "trained geographer," therefore I am not to have an opinion of my own, nor to believe what I see with my own eyes, but I am to take everything as gospel that I see printed on the maps. Why? Because those maps were prepared by "professional surveyors" and "trained geographers."

Would the writer of the article be surprised to hear that, in the map supplied to me by the authorities in Calcutta, the Aksu river (on the Pamirs) is made to run south-west after its junction with the Ak-Baital, and join the Ab-i-Panj at Bar Panjah, and to have no connection whatever with the Murghab or Bortang?

Also that the said Murghab river is made to rise near Uz-Bel and run north up to the Karakul, and then, after running *over* a range of mountains, comes down south and south-west to Kila Wamar, quite independant of the Aksu river, although they are one and the same river?

Also that in the same map the Bulunkul (not the Pamir one), out of which flows the Gez river, is located 40 miles north of its proper position, and the Gez river is depicted as rising out of the east end of the Little Karakul, which is situated as many miles to the south?

In another map the Pamir lake Bulunkul—which, as I mention in my book, is almost part of the Yeshil-Kul, at the west extremity of the Alichur Pamir—is depicted as nearly a whole degree further west, whereas the two are connected by such a short river that they appear almost one lake.

I could quote many other instances where these "professional surveyors" and "trained geographers" have made their maps *not from personal observations*, but from information supplied to them by the Kirghiz, whose statements are wholly unreliable.

He then finds fault with my altitudes. I merely gave the readings of Major Roche's and my aneroids, also supplied from the same source as the maps, and, to show how little confidence I placed in our aneroids, I mentioned the fact that there was a difference of several hundred feet between the elevation of the Chakmak lake above the sea-level as taken by Captain Trotter in 1873 or 1874, and Captain Younghusband in 1891, and as many hundreds again between the readings of our aneroids in 1892 and Younghusband's; and, if I remember correctly, I think I finished the sentence by saying, "So much for aneroid barometers."

As to the height of the Mustagh-Atta, the mistake was the printer's in taking my 3 for an 8, and the writer has worked himself into a most unnecessary state of excitement over it.

As to the controversy over the source of the Oxus, I have already given my reasons for believing the river Amu Daria rises in the Chakmak lake and runs to Kila Wamar under the name of Aksa or Oxus, therefore I shall not recapitulate them. I have met other Pamir travellers who are entirely of my way of thinking, men who have been there in Government employ, and whose opinions weigh more with me than those of the theoretical geographers who write long letters about places they have never seen.

On the subject of Chor-kul and Bang-kul, I repeat they are two distinct lakes, and not separated by a "dividing spit of sand," but a grassy knowe which separates them entirely. The two lakes are some distance apart. If ever they become one in summer, as the writer of the article seems to think they might, then in my opinion I would say that the Russian fort, which is very few feet above the level of the lakes, would be washed away annually.

Referring to my description of the Kirghiz tribes, the writer says I am "misleading in giving their names as (*a*) the Naiman, (*b*) the Kipchak," etc., and that "the Kipchaks are not Kirghiz by blood or descent."

My information was derived from the headmen of the different Kirghiz tribes I lived amongst for five months, but, of course, if the writer knows more about the Kirghiz than the Kirghiz themselves, I have not another word to say.

As for the Sarts, I never said they had anything to do with the Kirghiz; on the contrary, I distinctly stated that a Sart was the inhabitant of a town, and gave the derivation of the word, and that if a Kirghiz became a townsman he would become a Sart, but that if a Sart went to live a nomad life on the Pamirs he could never become a Kirghiz.

As to the Chinese Tartars. Before publishing my book I wanted to distinguish between the Chinese Turkis and other Turkis, such as Yarkandis, Kashgaris, etc., and, although adhering to Chinese Turkestan as the locality, I was advised by a distinguished member of the Council of the R.G.S. to call them Chinese Tartars rather than Chinese Turkistanis.

Again, as to the Surma-tash, or Black-stone (called by all preceding "trained geographers" and "professional surveyors" Somatash, which means nothing at all, whereas *Surma* is a Persian word for "black," and *tash*, of course, as every one knows, is "stone" in Turki), I saw it in the museum at Tashkend, but could get no information from the Russians as to date, the stone being badly broken. The translation was given to me at Kashgar by Mr. Macartney, the English political officer.

In conclusion, the animal the writer suggests to have been a female burhel was undoubtedly a kastura, or musk deer. How he got there I don't pretend to say, but Major Roche, three experienced Kashmir shikaries, and myself all saw it within 60 yards and through stalking-glasses. I had no rifle with me at the moment, and unfortunately Major Roche missed it, otherwise we might have had the skin a head to testify to the individuality of the animal.

DUNMORE.

London, June 11.

As I have no desire to retract any statement made in the notice of Lord Du more's book on the Pamirs, or to modify any of the remarks it contains, I see necessity to enter into a controversy. Lord Dunmore's letter is not quite relevan nor are some of his strictures to the point. I would only observe, therefore, tha in criticizing some portions of his book, I did so from a geographical point of vie only, and had no intention, as he appears to think, of supporting the incorrect an obsolete maps of the Government of India Survey Department. When Lord Dur more writes that he was furnished by that department with a map containin several glaring mistakes, he does not surprise me. Having no connection wit the Survey Department, I am not concerned in defending their maps.

THE WRITER OF THE NOTICE.

The Egyptian Government's Irrigation Atlas.

The Public Works Ministry of the Egyptian Government has published a foli volume (22 × 30 inches) under the title, 'Perennial Irrigation and Flood Protec tion for Egypt.' The index contains a list of 29 plates, of which 17 have bee lithographed. The other titles probably refer to sketches and draughts in th Public Works Department. There is a great deal of detailed geographical an topographical information, which has been secured at great pains and expense relating chiefly to the levels of the Nile from Gebel Silsileh to Wadi Halfa.

Plates xv. and xvi. are not, however, a correct geographical description of th southern Fayum, the Gharaq, and Raiyan basins. The area of cultivation in ma xv. wrongly covers a considerable area of desert. There are, also, thousands o acres of cultivated land with numerous villages on what is here marked as desert lying to the west of the "Bahr Nezlah" (Major Brown's map, 1892). "Nezlah here figures as "Naztet."

The nomenclature of the Wadi Raiyan has been arbitrarily changed. In th *Proceedings* of the R.G.S. of October, 1887, there is a map draughted by me en titled, "The Fayoum and the Raïan Basin." It followed, in certain features, th map drawn for the Berlin Geographical Society by Dr. Schweinfurth (Bd. xxi Taf. 2, 1886). Names appeared upon the German map, and upon those drawn b me and adopted by the British and Italian Governments, which had thus a pre scriptive right to be regarded as permanent. This was especially the case in regar to the extraordinary depression lying immediately contiguous to the Gharaq basin o the south. Its existence was revealed by the line of levels run by me in 1885, com municated to Dr. Schweinfurth for his map and so noted by him, and printed on th map of the R.G.S. (1887). It is an area of very irregular shape, with a maximu length of 9 miles and breadth of about 5 miles, below the level of high Nile (+ 3 metres) in the adjacent Nile valley. It drops to nearly sea-level, but rises again t a *col* of + 28 metres, where it connects with a second basin in turn communicatin by a *col* of + 25 metres with the large Raiyan depression. As it was of no know importance in 1882, and therefore nameless, I called it the Wadi Lulu. This nam appears on my map of 1888, on the War Office revision, and the map of the Italia Government, as well as that of Major Brown, 1892, p. 65. Lulu in Arabic mea "a pearl." The name has been popularized among the natives, and fully accepte in Egypt. It will, I think, be conceded that in avoiding the use of a person

European name I acted in accordance with a spirit that commends itself to cartographers.

The Public Works Ministry has, however, attached to this valley the name of one of its engineers, but I trust that, in accordance with assurances given me, this will not be repeated in any future edition. The unknown and uncouth name "Masaigega" is a misplaced substitute for the "Hagar Muschqiq (Scheiqiqe)" of Dr. Schweinfurth. "Bahr Belama," the universal Arabic word for a dry ravine, is here given to a hill and a proposed canal. "Salty Marl with Epsom salts," "Bitter Plastic clay," and "Parisian limestone," are terms manifestly improper. There are scores of minor blunders, but it will be sufficient if cartographers take note of these objections.

COPE WHITEHOUSE.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1893–94.

Thirteenth Ordinary Meeting, June 18, 1894.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

ELECTIONS.—*Edward Hovenden Barton; Dr. Joseph Russell Jeaffreson; W. H. Jessop; William Le Queux; Alfred John Barton Tapling.*

The Paper read was:—

"A Survey of the English Lakes." By Dr. Hugh Robert Mill.

Fourteenth Ordinary Meeting, June 25, 1894.—CLEMENTS R. MARKHAM, ESQ., C.B., F.R.S., President, in the Chair.

ELECTIONS.—*Major Gilbert S. Baynes (late King's Royal Rifles); Poultney Bigelow; Basil Hall Chamberlain; Alfred Henry Collier; Arthur G. Haydon, M.R.C.S.; Captain E. St. C. Pemberton, R.E.; Frederick Porter; Hugh Price, C.E.; James Gibb Shaw.*

The Papers read were:—

1. "Kafiristan." By G. S. Robertson, C.S.I.
2. "The Jackson-Harmsworth North Polar Expedition." By F. G. Jackson.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria-Hungary. **Grissin**

Die Vertheilung der städtischen Bevölkerung Oesterreich-Ungarns nach der Höhenlage der Orte, Von Dr. Karl Grissinger. Seperat-Abdruck aus den "Mittheilungen der k. k. Geographischen Gesellschaft," Nr. 3 u. 4. Vienna, 1894. Size 9½ × 6½, pp. 30. *Presented by the Author.*

Austria—Tyrol. *Globus* **66** (1894): 7–10. **Zemmr**

Deutsche und Romanen in Tirol, 1880 bis 1890. Von Dr. Zemmrich.

This paper analyses the linguistic composition of the province of Tyrol, showing, means of a map in colours, the districts in which German and Italian respectiv predominate.

Caucasus—Abkhazia. *Globus* **66** (1894): 17–21, 39–45, 54–57, 73–76. **Seidl**

Die Abchasen. Eine ethnographische Skizze von N. v. Seidlitz, Tiflis.

Denmark—Surveys. *Oversigt Danske Videns. S.* (1894): No. 1. **Zachar**

Bemærkninger om Gradmaaling, dens Formaal og Opgaver. Af Oberst Zachariæ. *Plates.* Pp. 13.

Contains a map of the lines of spirit-levelling carried out in the survey of Denma According to the usual Scandinavian habit, each paper in the volume is separat paged, and, beyond saying that it is in the first part, no detailed reference is possibl

England and Wales. **Brabr**

The Comprehensive Gazetteer of England and Wales. Edited by J. H. F. Brabner, F.R.G.S. [Vol. II. Cau—Goa.] London, W. Mackenzie, 1894. Size 10½ × 7, pp. 360. *Maps and Plates. Presented by the Editor.*

The second volume of this Gazetteer keeps up the character of the first.

France—Anthropology. *Mem. S. Anthrop. Paris* (3) **1** (1894): 1–80. **Colligr**

Anthropologie de la France. Dordogne, Charente, Creuse, Corrèze, Haute-Vienne. Par le Dr. R. Collignon, Médecin major à l'École de guerre.

A series of maps of the group of departments under consideration shows the tribution of mean height, colour of hair and eyes, and dimensions of head for the peo The discussion is very complete, and takes due notice of the influence of geographi environment in relation to racial peculiarities.

France—Bay of Biscay. *C.R.* **119** (1894): 122–125. **Hautre**

Les Courants et les vents sur la côte des Landes de Gascogne. Note de M. Hautreux.

France—Lakes of Vosges. *C.R.* **118** (1894): 1163–1164. **Thou**

Étude des lacs de Gérardmer, Longemer et Retournemer dans les Vosges. Note de M. J. Thoulet.

The three lakes referred to in this note had the maximum depths of 119, 96, 38 feet in the order given above.

France—Rhone. *Rev. G.* **35** (1894): 1–72. **Ro**

Le Canal de Jonction du Rhone à Marseille, par J. Charles Roux.

This paper is richly illustrated with maps, and it will form the subject of a note the Monthly Record.

Germany—Eifel. **Follma**

Die Eifel. Von Dr. Otto Follmann. [Forschungen zur deutschen Landes- und Volkskunde . . . herausgegeben von Dr. A. Kirchhoff. Achter Band. Heft 3.] Stuttgart, J. Engelhorn, 1894. Size 9 × 6½.

This memoir will be summarized elsewhere.

Germany—Oldenburg. *Deutsche G. Blätter* **17** (1894): 97–144. **Kollma**

Die Waldungen und der Waldbau des Herzogtums Oldenburg im Rahmen der volkswirtschaftlichen Entwickelung. Auf statistischer Grundlage dargestellt von Dr. Paul Kollmann. Mit Karte.

The map illustrates the distribution of state forests and other woods in the Du of Oldenburg. The paper is in continuation of a series dealing with the vari wooded districts of Germany.

Germany—Saxony. **Schrei**

Klimatographie des Königreichs Sachsen. Erste Mitteilung von Prof. Dr. Paul Schreiber. Mit zwei Tafeln. Stuttgart, J. Engelhorn, 1893. Size 9½ × 6½, pp. 98.

This is Part I. of vol. 8 of Kirchhoff's series "Forschungen zur deutschen Landes- und Volkskunde."

Germany—Würzburg. *Globus* 65 (1894): 381-385. **Ehrenburg.**

Die geographische Bedeutung Würzburgs. Von Privatdocent Dr. Karl Ehrenburg, Würzburg.

This paper is the revised and augmented version of a paper read to the Würzburg Historical Society, and presents a good epitome of the geographical conditions of the surroundings of the town as affecting its history.

Holland. **Blink.**

Nederland en zijne Bewoners. Handboek der Aardrijkskunde en Volkenkunde van Nederland, met Kaarten en Afbeeldingen, door Dr. H. Blink. 3 vols. Amsterdam, S. L. van Looy, etc. Size 9 × 6½, pp. (vol. i.) xii. and 596; (vol. ii.) 575; (vol. iii.) viii. and 540.

A complete geography of Holland, giving an account of the physical features, the climate, flora, the distribution of population, and the political divisions of the country.

Iceland. *G. Tidskrift* 12 (1893-94): 167-234. **Thoroddsen.**

Rejse i Vester-Skaptafells Syssel paa Island i Sommaren 1893. Af Adjunkt Th. Thoroddsen. Med Kort og Afbildninger i og udenfor Texten.

This is a detailed record of the author's latest journey in Iceland, with a description of the geology of the districts visited, illustrated by a geological map of Vester-skaptafells-syssel and several diagrams.

Iceland. *Verh. Ges. Erdk. Berlin* 21 (1894): 260-271. **Cahnheim.**

Zwei Sommerreisen in Island. Von Herr Dr. O. Cahnheim.

Dr. Cahnheim accompanied Dr. Karl Grossmann on his Icelandic tours, described in this *Journal*, vol. iii. p. 261.

Ireland—Caves. *P. R. Irish A.* 3 (1894): 305-310. **Rotheram.**

On some caves in the Slieve na Cailliagh District, co. Meath. By E. C. Rotheram.

The "caves" described in this paper are subterranean chambers of human construction, or at least modified by building entrance passages.

Ireland—Galway. *P. R. Irish A.* 3 (1894): 317-370. **Browne.**

The Ethnography of Inishbofin and Inishshark, co. Galway. By Charles R. Browne, M.D., of the Anthropological Laboratory, Trinity College, Dublin.

This inquiry was carried out on the same principles as that of the Aran Isles already recorded in these pages. The paper is illustrated by photographs reproduced on a rather small scale.

Ireland—Jacobite War. **O'Kelly.**

The Irish Home Library. The Jacobite War in Ireland (1688-1691). By Charles O'Kelly. Edited by George Noble, Count Plunkett, and the Rev. Edm. Hogan. Dublin, Sealy, Bryers and Walker, 1894. Size 7¼ × 4¾, pp. xii. and 115. *Portrait. Price 1s. Presented by Count Plunkett.*

Italy—Bologna, Ferrara, Piacenza. **Corti.**

Siro Corti. Le Provincie d'Italia sotto l'aspetto geografico e storico. Regione Emiliana. Provincia di Bologna (No. 57, pp. 60); Provincia di Ferrara (No. 58, pp. 45); Provincia di Piacenza (No. 59, pp. 53); Torino, G. B. Paravia & Co., 1893. Size 8 × 5. *Maps and Illustrations.*

Italy—Cartography. *Rev. G. Italiana* 1 (1894): 81-98. **Porena.**

Primo contributo di cartografia romana. Fillippo Porena.

A historical review of the mapping of Italy, and of the principal Italian cartographers.

Italy—Elba. *Rev. G. Italiana* 1 (1894): 164-183, 224-240. **Marinelli.**

Volumetria dell' Isola d'Elba di Olinto Marinelli.

This discussion not only contains an orometrical statement of the Island of Elba, but by the numerous references to other memoirs which are supplied it serves as a useful practical guide to the methods of estimating the volume of land-masses generally.

Mediterranean—Volcanoes. **Le**

Ueber die vulcanischen Ausbrüche bei Pentellaria 1891 und am Aetna 1892, Von Oskar Lenz. Sonderabdruck aus "Lotos," 1894, Band XIV. Size 9 × 6, pp. 14. *Presented by the Author.*

Montenegro. **Kenne**

Montenegro and its Borderlands, September, 1893. [By Robert J. Kennedy.] London, Hatchards, 1894. *For private circulation only.* Size 7½ × 5½, pp. 36. *Presented by the Author.*

This little book has as frontispiece an unacknowledged copy of a hand-map iss by the Royal Geographical Society, but the orthography of the names in the text d not correspond with that shown on the map, on which also the route marked is ap rently more extensive than that actually traversed by the author.

Norway. *J. of Geology* **2** (1894): 347–349. **Reus**

The Norwegian Coast Plain: a new feature of the Geography of Norway. By Hans Reusch.

The coast-plain is claimed as a new feature in the geography of Norway, but views by which the author of this short paper seeks to substantiate his conclusi bear a very striking resemblance to a simple raised beach, such as that which for the site of almost all the maritime towns and coast villages of Scotland.

Russia—Northern Provinces. **Rab**

Charles Rabot. A travers la Russie Boréale. Paris, Hachette & Co., 1894. Size 7½ × 5, pp. 320. *Illustrations. Price* 3*s.* 6*d.*

An account of a journey from St. Petersburg to the Petchora and the Obi, with appendix on the natural history of the region, a list of altitudes, and temperatu observed in the waters of the Pechora and the Shtchugur.

Russia—Novaya Zemlya. *Tour du Monde* (1894): 81–96. **Nossiloff and Paschk**

Voyage a la Nouvelle-Zemble, par M. Constantin Nossiloff, résumé par Madame Lydie Paschkoff.

An account of explorations in Novaya Zemlya between the years 1887 and 1892.

Scandinavia. **He**

Iron and Steel Institute. Scandinavia as a source of Iron Ore supply. By Jeremiah Head. May, 1894. Size 8½ × 5½, pp. 23. *Presented by the Author.*

Scotland—Lowlands. **Badde**

Thorough Guide Series. Scotland (Part III.). The "Lowlands," including Edinburgh and Glasgow, and all Scotland south of those places. By M. J. B. Baddeley, B.A. Third Edition. London, Dulau & Co., 1894. Size 6½ + 4½, pp. xii. and 184. *Maps and Plans. Price* 4*s. Presented by the Publishers.*

One of the most useful and trustworthy of guide-books.

Scotland—Place-Names. **Blac**

Place-Names of Scotland. By John Stuart Blackie. From *Blackwood's Magazine*, July, 1894.

This article makes critical reference to several recent books dealing with the pl names of Scotland.

Spain—Geological History. *Z. Ges. Erdk. Berlin* **29** (1894): 109–141. **Pe**

Studien über das Klima Spaniens während der jüngeren Tertiärperiode und der Diluvialperiode. Von Albrecht Penck.

This article is summarized in another part of the *Journal.*

Spain—Historical. *B.S.G. Madrid* **36** (1894): 193–239. **Blázq**

Las costas de España en la época romana, por D. Antonio Blázquez.

Subterranean Explorations. **Ma**

E. A. Martel. Les Abîmes, les Eaux souterraines, les Cavernes, les Sources, la Spélæologie. Explorations souterraines effectuées de 1888 à 1893 en France, Belgique, Autriche et Grèce avec le concours de MM. G. Gaupillat, N.-A. Siderides, W. Putick, E. Rupin, Ph. Lalande, R. Pons, L. de Launay, F. Mazauric, P. Arnal, J. Bourguet, etc. Paris, C. Delagrave, 1894. Size 12½ × 9, pp. viii. and 578. *Maps and Illustrations. Presented by the Author.*

This splendidly illustrated work gives in one systematic treatise an account of all M. Martel's recent subterranean researches, of which note has been taken in the *Journal* from time to time as they were published. He introduces the term *speliology* for the new department of geography which he has opened up.

Switzerland—Tödi Range. **Coolidge.**

Conway and Coolidge's Climbers' Guides. The Range of the Tödi. By W. A. B. Coolidge. London, T. Fisher Unwin, 1894. Size 5½ × 4, pp. xxx. and 167. *Price* 10*s*. *Presented by the Publisher.*

The present volume describes the north side of the Vorder Rhein valley, embracing the great north-east spur of the main chain of the Alps, which divides Uri and Glarus from the Graubünden. Four main groups are thus described, the ridges enclosing the Maderanerthal, the great central mass of the Tödi itself, the loftiest summit between the Bernese Oberland and the Bernina groups, the ridges round Elm at the head of the Sernf valley, and those around the Calfeisen valley, south-west of Ragaz.

ASIA.

Aden. *Minutes P.I. Civil Engineers* 116 (1894): 275-283. **Child.**

Aden Harbour. By William Samuel Child.

An account of the harbour works at Aden, with a sketch-map.

Annam. **Wislicenus.**

Die Küste von Annam. Im Auftrage der Direktion der Seewarte aus dem neuesten französischen Segelhandbuch übersetzt vom Hülfsarbeiter Kapt.-Lieut. a. D. Wislicenus. "Beiheft II. zu der Annalen der Hydrographie und Maritimen Meteorologie," Heft V. (Mai), 1894, pp. 40.

Asiatic Investigations. **Elliott.**

Annual Address delivered to the Asiatic Society of Bengal. By Sir Charles Alfred Elliott, Calcutta, February 7, 1894. Calcutta, 1894. Size 9 × 6½, pp. 85.

A general summary of the advances in oriental literature, and in the exploration of Asia during 1892 and 1893.

Asiatic Mountain Systems. *Scottish G. Mag.* 10 (1894): 337-352. **Morgan.**

The Mountain Systems of Central Asia. By E. Delmar Morgan. *With a map.*

A critical summary of the present state of our knowledge of the orography of Central Asia. The map brings out the structure of the continent by a combination of tinted contours and hill-shading.

Cyprus—Bibliography. **Cobham.**

An attempt at a Bibliography of Cyprus. By Claude Delaval Cobham. Third edition. Nicosia, 1894. Size 7½ × 5½, pp. 40. *Presented by the Compiler.*

The present list contains 497 titles, with new sections of Cartography and Consular Reports.

India—Folklore. **Crooke.**

An Introduction to the Popular Religion and Folklore of Northern India. By W. Crooke, B.A. Allahabad, 1894. Size 9½ × 6, pp. ii. and 420. *Presented by the Author.*

An attempt to recover the vestiges of primitive folk-customs amongst the people of Northern India, now being rapidly modified by the rapid spread of Brahmanism.

India—Madras Presidency. ———

Manual of Standing Information for the Madras Presidency, 1893. Madras, 1893. Size 13½ × 8½, pp. v., 139, and vii. *Map. Presented by the Secretary of State for India.*

The first chapter deals with the physical features of the country, its area, climate, and staple productions.

India—Narsinghpur District. **Logan.**

A Night in India. By Mrs. S. C. Logan. From the *Nineteenth Century*, July, 1894.

Java. **Col**

Six Weeks in Java. By Colonel Sir H. Collett. From *Blackwood's Magazine*, July, 1894.

Persia—Bakhtiari Country. **Saw**

Report of a Reconnaissance in the Bakhtiari country, South-West Persia. By Major H. A. Sawyer, B.S.C. Simla, 1891. Size 9½ × 6½, pp. 108. *Maps, Sections, etc. Presented by the Secretary of State for India.*

The substance of this Report was communicated by Colonel Sawyer to the Rc
Geographical Society at an evening meeting, and will be published in the *Journal*.

Palestine and Syria. **Boutr**

La Palestine et la Syrie a vol d'oiseau. Conférence faite à la Séance de la Commission central de la Société de Géographe de Paris du 2 mars 1894, accompagnée d'une carte, par Alexandre Boutroue. Extrait de la Revue de Géographie (Avril et Mai 1894). Paris, E. Leroux, 1894. Size 10 × 7, pp. 23. *Presented by the Author.*

Siberia *Petermanns M.* 40 (1894): 131-138, 1. **T**

Mitteilung über eine Reise nach den Neusiberischen Inseln und längs der Eismeerküste ausgeführt im Jahre 1893. Von Baron E. v. Toll.

The full account, with sketch-map of route, of Baron Toll's last journey to the N
Siberian Islands, of which an abstract appeared in the *Journal* for May, vol. iii. p. 4

Syria. *Z. Ges. Erdk. Berlin* 29 (1894): 142-188. **Hartma**

Das Liwa Haleb (Aleppo) und ein Teil des Liwa Dschebel Bereket. Reisen, ausgeführt mit Unterstützung der Karl Ritter-Stiftung der Gesellschaft für Erdkunde und dargestellt von Martin Hartmann. *With Map.*

Turkey in Asia. **Maun**

Aldershot Military Society. The Geography of Eastern Turkey in Asia. By Captain J. R. Maunsell, January 16, 1894. Aldershot, Gale & Polden. Size 8 × 5, pp. 12. *Map. Presented by the Author.*

AFRICA.

African Boundaries. —

The New African Crisis with France and Germany. From *Blackwood's Magazine*, July, 1894.

African Boundaries. **Wh**

The Partition of Africa. By A. Silva White. From the *Nineteenth Century*, July, 1894. *With a Map.*

African Dwarfs. **Le**

Ueber die sogenannten Zwergvölker Afrikas. Von Oskar Lenz. Vienna, 1894. Size 7½ × 5, pp. 38. *Presented by the Author.*

Reprinted from the publication of the "Verein zur Verbreitung naturwissenschaftlicher Kenntnisse in Wein."

Algeria. —

Le Pays du Mouton. Des conditions d'existence des troupeaux sur les Hauts-Plateaux et dans le Sud de l'Algérie. Ouvrage publié par ordre de M. Jules Cambon, Gouverneur Général de l'Algérie. Algiers, 1893. Size 14½ × 11, pp. 533 and cxxvii. *Maps and Illustrations. Presented by Colonel Sir Lambert Playfair, K.C.M.G.*

This important work, composed under the superintendence of M. E. Du Cha
from materials supplied by MM. A. Turlin, F. Accardo, and G. B. M. Flamand, gi
a description of the immense regions of Southern Algeria, where the breeding of sh
is carried on, and where are the homes of the nomad Arabs and their flocks.
indicates the resources, as regards water and pasturage, which these regions aff
It includes all the *territoires de Commandement*, *cercles* and *annexes* of the th
provinces of Algiers, Oran, and Constantine, with the exception of Lake Maghi
which, as it belongs to the Tellian Regions, is not included in this work. There
four appendices—(1) Maladies parisitaires les plus graves du Mouton Algérien (n
de M. Railliet). (2) Travail, et emploi des laines par les indigenes (Burnous, Ha
Tapis). (3) Table alphabetique des noms Arabes des principaux végétaux des Hau
Plateaux et du Sahara algérien. (4) Table des Genres.

British Central Africa. **Johnston.**

British Central Africa. By H. H. Johnston. From the *New Review*, July, 1894.

Canary Islands. *B.S.G. Madrid* 36 (1894): 267-270. ——

El puerto de La Luz en la isla de Gran Canaria.

A large-scale map of the harbour of La Luz accompanies the paper.

Congo State—Katanga. *Petermanns M.* 40 (1894): 121-130. **Cornet.**

Die geologischen Ergebnisse der Katanga-Expedition. Von Dr. J. Cornet in Gent. *With Map.*

Dr. Cornet received and examined the geological specimens collected by the Katanga Company's expeditions, and from them has compiled a provisional geological map of the southern extension of the Congo State.

German East Africa. **Baumann.**

Die kartographischen Ergebnisse der Massai-Expedition des Deutschen Antisklaverei-Comités. Von Dr. Oscar Baumann. Ergänzungsheft 111. zu Petermanns Mitteilungen. Gotha, Justus Perthes, 1894. Size 11 × 8, pp. 56. *Price 7 marks.*

The memoir includes lists of positions and altitudes with notes by several writers, and a four-sheet map of the northern part of German East Africa, compiled on the scale of 1 : 600,000 from Dr. Baumann's data, by Dr. B. Hassenstein.

German East Africa. *Deutsches Kolonialblatt* 5 (1894): 308-317. **Volkens.**

Reise des Dr. G. Volkens nach Moschi.

The account of a visit to the German military post at Moschi in December last, with notes on the botany, and the prospects of cultivation on the slopes of Kilimanjaro.

German East Africa. **Brehme.**

M. Forschungs. Deutschen Schutzgebieten 7 (1894): 106-130.

Bericht über das Kulturland des Kilima-Ndjaro und dessen klimatische und gesundheitliche Verhältnisse. Von Oberstabarzt Dr. Brehme.

German East Africa. **Warburg.**

M. Forschungs. Deutschen Schutzgebieten 7 (1894): 131-199.

Die Kulturpflanzen Usambaras. Von O. Warburg.

Gold Coast. **Ferguson.**

Report on Mission to Atabubu. By G. E. Ferguson. London, 1891. Size 13½ × 8½, pp. 26. *Maps and Illustrations. Presented by the Secretary of State for the Colonies.*

Morocco. **Meath.**

A Land of Incredible Barbarity. By the Right Hon. the Earl of Meath. From the *Nineteenth Century*, July, 1894.

A sketch of existing conditions in Morocco.

Nile sources. *Deutsche G. Blätter* 17 (1894): 144-152. **Asmussen.**

Die Entdeckung der Nilquellen Von P. Asmussen.

A historical note on the discovery of the sources of the Nile.

Portuguese East Africa. *B.S.G. Lisboa* 13a. ser. No. 3 (1894): 129-176. **Xavier**

Reconhecimento do Limpopo (os territorios ao sul do Save e os vatuas) por Alfredo Augusto Caldas Xavier.

An account of the delimitation of the British and Portuguese possessions in South-East Africa, with maps and illustrations.

Portuguese West Africa. *Rev. G.* 34 (1894): 430-433. **Madrolle.**

L'Apertado, canal naturel entre la Casamance et le Cachéo. Par C. Madrolle.

This note is accompanied by a map showing the natural communication, navigable by canoes, between the two rivers Casamance and Cacheo.

Sahara—Tuaregs. *B.S.G. Paris* 14 (1893): 500-544. **Foureau.**

Une mission chez les Touaregs. Par F. Foureau. *With a Map.*

The paper now published was read to the Paris Geographical Society in May, 1893.

South Africa, Migrations. *M. V. Erdk. Leipzig* 33 (1893): 1-90. **Bar**

Völkerbewegungen auf der Südhälfte des afrikanischen Kontinents. Mit einer Karte. Von Dr. Karl Barthel.

A study of the migrations of native tribes and of the movements of European set in South Africa, which will be noticed in some detail.

Sudan—People. **Frobe**

Die Heiden-Neger des ägyptischen Sudan. Von Herman Frobenius. Mit einer Karte im Massstab 1: 3,000,000. Berlin, Dietrich Reimer, 1893. Size 9½ × 7, pp. 484. *Price* 12*s*.

Tropical Africa. **Ad**

Tropical Africa as a Factor in Civilization. By Cyrus C. Adams. Size 10 × 6½, pp. [12]. From *Our Day*, vol. xiii., No. 78, 1894.

Uganda. **Po**

The British Mission to Uganda in 1893. By the late Sir Gerald Portal, K.C.M.G., C.B. Edited with a Memoir by Rennell Rodd, C.M.G. With the Diary of the late Captain Raymond Portal, and an Introduction by Lord Cromer, G.C.M.G. London, E. Arnold, 1894. Size 9 × 6, pp. xlvi. and 351. *Map, Portraits, and Illustrations. Price* 12*s*. *Presented by the Publisher.*

This important work will receive special notice.

NORTH AMERICA.

Archæology. **Bi**

Travels amongst American Indians, their ancient earthworks and temples; including a journey in Guatemala, Mexico, and Yucatan, and a visit to the ruins of Patinamit, Utatlan, Palenque, and Uxmal. By Vice-Admiral Lindesay Brine. London, Sampson Low, Marston & Co., 1894. Size 9½ × 6, pp. xvi. and 422. *Price* 21*s*. *Presented by the Author.*

This volume will be specially reviewed.

Archæology. *P. American Philosophical S.* 31 (1893): 258-313. **Brin**

The Native Calendar of Central America and Mexico: a study in Linguistics and Symbolism. By Daniel G. Brinton, M.D.

Archæology. **Pa**

The Sacred Symbols and Numbers of Aboriginal America in Ancient and Modern Times. By Francis Parry. (Reprinted from *Bulletin* of the American Geographical Society, No. 2, 1894.) Size 9 × 6, pp. 45. *Illustrations. Presented by the Author.*

Bermuda. *American J. Science* 47 (1894): 411-416. **Agas**

Notes from the Bermudas. By A. Agassiz.

A short but important paper, which will be summarized in the Monthly Record.

Mexico—Toltecs. *T. Texas A. Science* 1 (1893-94): 57-71. **Cer**

The Pilgrimage and Civilization of the Toltecs. By David Cerna, M.D.

United States—Appalachians. *National G. Mag.* 6 (1894): 63-126. **Hayes and Campl**

Geomorphology of the Southern Appalachians. By C. Willard Hayes and Marius R. Campbell.

This is an elaborate essay in the geological development of an interesting regi worked out for the United States Geological Survey, and illustrated by several pla including a photographic relief of the southern Appalachian region. The geologi history of the region is intimately connected with the changes of course in the T nessee river, and its relation to the general orographic lines. These changes are tra back through the whole range of geological time, and furnish an interesting recor the development of an existing tract of land.

United States—Arid Lands. *J. Manchester G. S.* 9 (1893): 135-142. **Redw**

The Influence of Rainfall on Commercial Development: a Study of the Arid Region. By Mr. Jacques W. Redway.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

Dolomite Alps. **K. u. K. militär-geogr. Institut., Wien.**

Topographische Detailkarten, V., Ampezzaner und Sextener Dolomiten. Scale 1: 50,000 or 1·4 inch to a geographical mile. Ausgeführt im k. u. k. militär-geogr. Institut. in Wien. Mit Bezeichnung der markirten Wege. Commissions-Verlag des k. u. k. militär-geogr. Institutes: R. Lechner's k. u. k. Hof-und Univ. Buckhandl. (Wilh. Müller.) *Price* 1 *fl.* 70 *kr.* (unmounted).

England and Wales. **Ordnance Survey.**

Publications issued since June 8, 1894.

1-inch:—

ENGLAND AND WALES:—194, 325, engraved in outline, 288. Hills engraved in black and brown, 1*s.* each.

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Town Plans—5-feet scale:—

Ashton-under-Lyne and Stalybridge (Revision), II., 2*s.* 6*d.* This town is now complete in 16 sheets, 2*s.* 6*d.* each. Index, 4*d.*

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(*E. Stanford, Agent.*)

ASIA.

China. **Wade and de Villard.**

A Map of the Shooting Districts lying between Shanghai and Wuhu. Compiled and carefully revised by H. T. Wade and R. A. de Villard, Shanghai, October, 1893. Scale 1: 446, 192 or 7·2 stat. miles to an inch.

This map will be extremely useful to sportsmen, and appears to have been published for their special benefit. It is accompanied by a table of distances from Shanghai and other places.

AFRICA.

German East Africa. **Baumann.**

Originalkarte des nördlichen Deutsch-Ostafrika, für das Deutsche-Antisklaverei-Komite nach eigenen Aufnahmen u. Ortsbestimmungen construiert von Dr. Oscar Baumann. Mit Benutzung der Englischen Grenztriangulierung, der Original-aufnahmen von Dr. G. A. Fischer (1885-86), Kapitän Spring u. Leutnant Werther, sowie unter Berücksichtigung aller vorhandenen Materialien, bearbeitet u. gezeichnet von Dr. B. Hassenstein. Scale: 600,000 or 9·4 stat. miles to an inch. Petermann's 'Geographische Mitteilumgen,' Jahrgang, 1894. Ergänzungsheft

No. III. Taf. 1, 2, 3, 4. Gotha: Justus Perthes. *Presented by Dr. Os Baumann.*

This is a very excellent map of the northern part of German East Afri compilation of which all the latest and most reliable material has been u routes followed by all the principal explorers are laid down, those of Dr. being distinguished from the others by being coloured red. The boundary by Anglo-German Boundary Commission, 1892, is shown, and the positions fixed by astronomical observations by the author and Capt. Spring have the and longitudes given below their names, and the heights are in metres.

AMERICA.

United States. **Rand, McN**

Indexed County and Railroad Pocket Map and Shipper's Guide of Minnes (1: 1,020,000 or 15·9 stat. miles to an inch), Montana (1: 1,900,000 29·9 stat. miles to an inch), Wisconsin (1: 1,000,000 or 15·6 stat. miles an inch). Rand, McNally & Co., Chicago & New York. New Editio 1894. *Price 25c. each. Presented by the Publishers, through E. Stanfo Esq.*

AUSTRALIA.

Western Australia. **V**

Geological Sketch Map of Western Australia, 1894. Scale 1: 3,000, or 48·4 stat. miles to an inch. Harry P. Woodward, F.G.S., F.R.G Government Geologist, Perth. Compiled and published by authoi of the Government of Western Australia, by George Philip and S London. *Presented by Messrs. G. Philip and Son.*

On this map are shown the results of the investigations of the Government of Western Australia, Mr. H. P. Woodward. The colours are well chosen, well to illustrate the purpose for which the map has been published. In a the rock formations, the localities in which the different minerals exist are in

CHARTS.

United States Charts. **U.S. Hydrograp**

Pilot Chart of the North Alantic Ocean, July, 1894.—Pilot Chart of North Pacific Ocean, 1894. Published at the Hydrographic Offi Bureau of Navigation, Department of the Navy, Washington, D Charles D. Sigsbee, Commander U.S.N., Hydrographer.

PHOTOGRAPHS.

East Africa. **Sc**

23 photographs of East Africa, taken by G. F. Scott-Elliot, Esq., 18 *Presented by W. Scott-Elliot, Esq.*

This is a set of photographs taken by Mr. G. F. Scott-Elliot during his voya East Coast of Africa, and on his journey into the interior from Mombasa.

Asia.

283 photographs taken in Persia, Turkey, and the Caucasus in 1891, A. P. H. Hotz, Esq. *Presented by A. P. H. Hotz, Esq.*

This series consists of 283 photographs, taken by Mr. A. P. H. Hotz Turkey, and the Caucasus. It contains characteristic views of the scenery, p buildings both ancient and modern, and is a valuable addition to the Society's

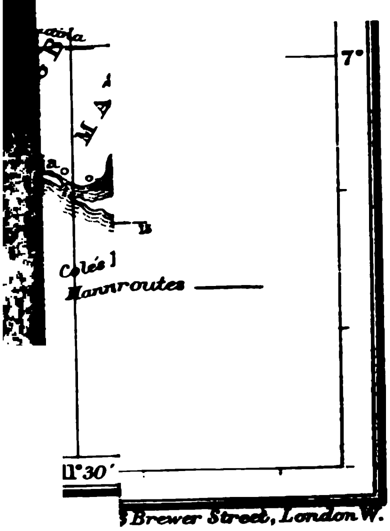
Persia.

Photograph of Valerian's Bridge across the Karun River, Shuster, Per *Presented by Dr. J. Craig.*

This is an excellent enlargement of a photograph of Valerian's bridge Karun River at Shuster, taken by Mr. Taylor, of Basra. The centre of the wanting, but the photograph shows that the remaining portion is in a goo preservation.

N.B.—It would greatly add to the value of the collection o graphs which has been established in the Map Room, if all the of the Society who have taken photographs during their travel forward copies of them to the Map Curator, by whom they acknowledged. Should the donor have purchased the photogr will be useful for reference if the name of the photographer address are given.

BRARY
ford, Jr.



Brewer Street, London W.

The

Geographical Journal.

No. 3. SEPTEMBER, 1894. Vol. IV.

KAFIRISTAN.*

By G. S. ROBERTSON, C.S.I.

The country about which I hope to be able to interest you to-night was, up to a few years ago, entirely unknown and unexplored, and still remains one of those few inhabited regions of the world only partially understood. Many accounts have been given us by painstaking compilers of the narratives of various more or less trustworthy Oriental travellers, who had visited, or professed to have visited, the sombre valleys and the wild independent mountaineers who people this little-known land, and the genius of Rudyard Kipling selected this very country as the scene of one of his most remarkable stories—the story of the man who would be a king. I am compelled to confess that Mr. Kipling's exquisite story is not one whit more imaginative or less true to exact fact than many of the narratives of those earlier writers I have referred to.

The whole district is known by the name of Kafiristan, which literally means "the land of the Infidel," just as Hindustan means "the land of the Hindu" and Afghanistan "the land of the Afghan." This designation, originally applied to the country as a term of reproach by the Mohammedan peoples, by whom it is now completely encircled, is well known to scientific geographers and other learned men, and has been so long accepted as the true name of the whole country, that it would be unwise and confusing for us now to change it, even if we had any other word at our command which would more correctly and definitely explain our meaning. Moreover, the term "Kafir" is readily accepted by the people to whom it is applied, who may indeed be said to glory in the title, although it is one which they themselves are qu incapable of pronouncing.

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* Paper read at the Royal Geographical Society, June 25, 1894, Map, p. 288.

Kafiristan, then, is a geographical expression used to designate t country of those non-Mahomedan tribes who inhabit that space l blank in our maps, which is bounded on the east by Chitral and t Kunar valley, on the south-east by the Kunar valley, on the west Afghanistan, and on the north by the Hindu Kush and by Badakhsh Politically speaking, the whole region is bounded on the east by Chit and the debatable land of the Kunar valley, and on all other sides Afghan territory.

Before my own visit to Kafiristan, with one single exception, no oth European had ever penetrated there. The exception referred to w Lockhart's mission, which in September, 1885, crossed from Chit into the upper part of the Bashgul valley, remained there a few da and then withdrew into Chitral by another road.

The gallant McNair, whose untimely death deprived the Indi Survey Department of one of its most resolute and enterprising office never entered the real Kafir country at all; he only succeeded reaching some of the Kalash villages of Chitral, which he mistook f the true Kafiristan. The Kalash referred to are an idol-worshippi tribe, slaves to the Mehtar of Chitral, and must not be confounded wi the independent mountaineers of Kafiristan, from whom they differ language, dress, manners, and customs, but still more notably in the mental and physical characteristics.

The actual amount of country I was able to explore was not of a great extent. I traversed the whole of the Bashgul valley, and ma of its subsidiary valleys, from end to end, and crossed from it into t top of the Minján valley of Badakhshan. I also examined the Kun valley, and many of its side valleys from Mirkani to Bailam. Finally penetrated into one of the inner valleys of Kafiristan, called Viron Wiron by Mahomedans, and Presun by the Kafirs. This is probab the most sacred, as it is certainly the most interesting, place in t whole country. In accomplishing this very limited amount of travel expended more than a year. Tribal jealousies were so great, and n position was oftentimes so difficult, that it was frequently a questio not of my being able to get on, but of my being able to maintain mys in the country at all; while on one occasion the uncomfortab suggestion was fiercely debated if it would not be advisable for the tri to keep me a close prisoner for three years, and compel me during th period to send to India for as much money and as many rifles as n proposed custodians should see fit to demand.

On another occasion I was civilly but decidedly told by my fi entertainers, the Kam tribe, that I must leave their country altogeth I not only had to comply with this order, but they also refused to allo me to proceed straight up the Bashgul valley to the country of anoth tribe, the Lutdeh Kafirs, who had been clamouring for a second visit from me, and, as an inducement, had promised to take me to the valley occupied by the Presun or Viron people, to whom I have already slightly referred. Unfortunately, however, the Lutdeh men had in the mean time raided through the Presun valley, and into the territory of another tribe I was most desirous of visiting. This complicated matters very greatly; and when I reached the Lutdeh people, after a toilsome roundabout march over the hills, I found to my mortification that their fervour in my behalf had greatly cooled down, and that under Chitral influence, which was then very strong with them, they were no longer desirous of my remaining in their country. Under these circumstances, and also to gain time, I was compelled to seek the hospitality of an old outlaw, who most kindly entertained me for some days, when we parted, he to leave Kafiristan for ever, as the place had become too hot for him, and I to try and discover some means of getting back to my first entertainers, the Kam. After much trouble and difficulty, I eventually succeeded in doing so, and returned to Kamdash to find that village on the verge of furious fighting on my account. It was only after great effort that bloodshed was avoided, and the tribe, reunited for the moment, agreed to take me to that inner valley on which my heart was set. My journey there was sufficiently uncomfortable. My escort consisted of my active opponents amongst the Kam people, for it was only on my consenting to be so accompanied that fighting was avoided, and it was possible for me to go on at all. I trusted, moreover, to my personal influence over the unruly members of my escort, so soon as we had once started away from the village, to enable me to get on satisfactorily; but, unluckily, I fell ill on the march, and was consequently unable to restrain the first beginnings of a disturbance which eventually grew to serious dimensions. My companions tried every dodge Kafirs know of bullying and blackmailing. Each succeeding morning brought its daily quarrel. Sometimes they deserted me altogether, or pretended to do so, and always tried this manœuvre at some more or less critical moment—as, for instance, when we were in a village supposed to be dangerous and hostile to us. Finally they became so outrageous that they rushed my tent, secured my firearms, arrested my servants, and I myself was compelled to escape from them over a fort wall during the night, to avoid being tied to poles and carried off a prisoner.

Amongst all these disturbing influences it might be thought that my life was not of a kind conducive to quiet observation, or the drawing of careful deductions from what I actually saw; but as a matter of fact there comes a time, much sooner than might be imagined, when conduct which under other circumstances would be justly considered outrageous, is accepted as a matter of course, and one's life flows on as placidly under strange and unprecedented conditions, as if one were merely involved in the ordinary everyday petty worries of civilized life.

Then possible dangers no longer appeal to the dulled imagination, and if they do eventually arise, they are yet found to bring with them their own peculiar compensation. It may be said with truth that my Kafir friends unconsciously did everything in their power to keep my mind active, and prevent its stagnating from monotony. So, therefore, if I failed in observing those things which I ought to have observed, the cause of failure must be held as due to my own deficiencies, and not as the result of the odd behaviour of my friends. When the time came for me to leave Kafiristan, which I did with the almost too cordial approval of my hosts, I went away with something very like regret, and with a fixed determination to return the following year, when affairs might be expected to have quieted down a little. That determination, however, was never carried out; it is probable now that it never will be, and perhaps the wish to do it is much less strong than it was, even if it exist at all. Yet I now and always shall feel kindly disposed towards the Kafirs. Several of them are my sincere friends, large numbers are well disposed towards me; and no blood lies between us. In some of the broils and turmoils blows were exchanged and one or two wounds inflicted, but no single man was killed or even seriously injured on my account. I never had to fight Kafirs myself, nor was I ever actually attacked by them. Indeed, in spite of their violent behaviour at times, I have more than once been assured by my most troublesome opponent that they bore me personally no ill-will whatever, for, as they said, I had never wronged nor injured any of them. They admitted that all their anger was roused by the suspicion that I gave money and other presents to certain of their fellows, while their peculiar notion of independence was, that all should share and share alike in my favours, whether they had done any actual work for me or not.

As an instance how comparatively easy these wild people are to manage, I may mention that I have sometimes sat placidly watching a Kafir parliament, when from the fierce gestures in my direction, made with splendid dramatic action by men pale with rage, any one unacquainted with the people might have fairly assumed they were demanding me as their sacrifice, and when their words were no doubt outrageous enough, could I have fully understood them. When the disaffected in a body have sprung to their feet and left the camp, so to speak, I have on such occasions more than once stopped one of the furious throng to ask some trivial but kindly question about his family. The result was almost invariably the same. The choking madman would glare at me for an instant, cast a wild glance at his companions, give a rueful kind of smile, and nod his head or wave his hand if he were too much discomposed to be able to reply in words.

There were, indeed, critical moments when a conflict seemed inevitable, yet it never occurred. Absolute command of one's temper—and it is curious how completely a real crisis quiets the anger of an Anglo-Saxon and clears his mind—is a most potent weapon with which in nine cases out of ten a Kafir can be utterly defeated, provided always that he has no real injury to avenge. All the time I was in Kafiristan I hardly had anything stolen. I have had sheep carried off, and, as I have already mentioned, my guns were on one occasion seized, but I got all my property back again in every single instance; I even made some Kafirs give up the property they had plundered from a man discharged from my service, and whom they consequently looked upon as their lawful prey. When the fact is carefully remembered that these same Kafirs are hereditary brigands and assassins, there is little wonder that I should feel kindly disposed towards them for their average treatment of me—a man so entirely different from any one else they had ever seen.

Kafiristan consists of an irregular series of main valleys, for the most part deep, narrow, and tortuous, into which a varying number of still more difficult, narrower, and deeper valleys, ravines, and glens pour their torrent water. The hills which separate the main drainage valleys the one from the other are all of them of considerable altitude, rugged and toilsome. As a consequence, during the winter Kafiristan is practically converted into a number of separate communities with no means of intercommunication. Take, for example, the Bashgul valley: during the time the hills are under snow, the only way to reach the Katir people who inhabit the upper portion of the district is to travel from the Kunar valley through the territory first of the Kam and then of the Mádugal tribe. Supposing either of these two tribes be at war with the Katirs, the last named are then completely isolated from the rest of the world, until the passes open in the spring. The inhabitants of Viron or Presun are similarly cut off from the surrounding tribes, for the only entrance to their country, when the passes are closed, is up the river which flows into the Kunar at Chigar Serai. All the passes which lead from Badakhshan into Kafiristan are certainly over 15,000 feet in height. I myself have only explored two of these, each of which was above the altitude mentioned, and I was assured that those two were the lowest of the series. On the Chitral side the roads over the enclosing ranges, although somewhat less elevated, are still very high, and are completely closed by snow in the winter. There is one low ridge 8400 feet between the Kalash village of Utzun and the Kafir village of Gurdesh, but even that is impassable for two or three months every winter.

Some of the ravines up which regular roads run are of most picturesque and romantic description, others are bare rocky glens. Indeed, many various kinds of scenery are to be met with according to differing altitudes and to other circumstances. At the lower elevations fruit trees abound, and in the hot weather the traveller pushes his way along the torrent's bank through thickets and tangles of wild grapes and pomegranates. At such low elevations splendid horse-chestnuts and other shade trees afford pleasant resting-places, while the hill-slopes are covered by shrubs, wild olive, and evergreen oaks. At somewhat higher elevations, say from 5000 to 8000 or 9000 feet, dense pine and cedar forests abound. They are composed of magnificent trees, which with a snow background afford most delightful prospects. Higher still, the pines cease; the hills are then almost bare, rocky, shaly, etc.; while the willow, birch, and the juniper cedar are the chief trees met with, and the wild rhubarb grows abundantly. Higher still—that is to say, above 13,000 feet—there is no vegetation of any kind, except rough grasses and mosses.

The rivers, as they descend the corkscrew valleys and are fed by subsidiary streams from the ravines, glens, or mountain recesses, increase in velocity until they become raging torrents, dashing against the huge boulders which obstruct their course, and flinging high their spray with deafening uproar. In many places where the tortured water foams and lashes itself against the rocks on its margins or in its bed, the river almost assumes the nature of a cataract, and is indescribably beautiful. Tree-trunks encumber the waterway, jam themselves against the rocks, pile up in picturesque confusion, or hurry round and round in the swirl of a backwater. To lovers of wild scenery many parts of Kafiristan could not be surpassed anywhere. In the autumn and winter months many of the valleys are in shadow very early in the day, and are strangely sombre and mysterious-looking. I always remember my first visit to Kafiristan in October, 1889, when a certain hot day's march was followed by the swift-coming afternoon shadow. How, tired out, I sat by the river's edge under a horse-chestnut, whose changing leaves alone relieved the deepening gloom. My companions were some distance away, while near at hand a hideous effigy transfixed me with its white stone eyes. The only human figure in the scene except my own, was a wild-looking man clad merely in a black goatskin, his long hair streaming behind, as he ran softly but swiftly down a rocky slope, hand on dagger, to discover who the intruder was. His movements were so noiseless, the valley was so deeply in shadow, and yet objects could be discerned so distinctly, that the whole seemed like a dream; and if ever I am suddenly asked what Kafiristan is like, this scene—the sombre valley, the wild river, the horse-chestnut tree, the fantastic effigy, and the hardly less fantastic man—rises at once before my eyes.

All the rivers of Kafiristan drain into the Kabul river, either directly or after first emptying themselves into the Kunar river at Arundo, Palasgar, Chigar Serai, etc. Of the valleys to the extreme west I know nothing except by hearsay, but I believe the Ramgul and the Kulam torrents joining together reach the Kabul river through Lughman. The next valley to the east, the Kti, joins its waters with those of the Presun valley, and after receiving the Wai river, flows into the Kunar at Chigar Serai. The Ashkun rivers probably also join the Kti, and Presun torrents, before they empty themselves into the Kunar. The Bashgul river with its various tributaries, the largest of which are the Skorigul, the Nichingul, and the Pittigul streams, joins the Kunar exactly opposite the cultivated fields just above the "Gabar" village of Arundo.

The main roads of communication, if roads they may be called, are almost invariably along the river-banks, so narrow and so steep are the valleys. Although they vary very greatly the one from the other, they have this quality in common, that they are almost always extremely difficult. That part of the Bashgul valley above Chabu, as well as nearly the whole of the Presungul, is quite easy when you once get into those districts; but all other Kafiristan roads which I travelled over were simply abominable. Perhaps the worst of all are those on the left bank of the lower part of the Bashgul river and those in the Dungul valley. There it is rare to find even a couple of hundred yards of moderately level ground, so in marching it is one incessant clamber along rough stony tracks, which run over spurs and bluffs, or by means of frail wooden galleries across the faces of low precipices. Sometimes it is most difficult to get over the smooth rock surfaces; indeed, in some positions, where the ground is of this character, the inexperienced or badly shod traveller may only be able to proceed at all by edging himself along in a sitting posture. Dogs cannot get over those places without assistance. The bridges over the rivers are sometimes extremely well built, but are high above the water, and often not more than 18 or 20 inches wide in the middle, with parapets only a few inches high, so that the whole structure looks far more like an irrigation trough than a bridge. They are somewhat trying to the nerves, especially if you are suffering or are just recovering from an attack of fever. If this is a description of the good bridges, it may easily be conceived how extremely bad the inferior ones are. Sometimes a fractured tree hanging across a narrow stream is utilized as a bridge, and the traveller has to run along the tree-trunk at an angle dependent on the height at which the tree partially broke away from the parent stem. Yet these are pleasant and safe ways over the torrent, when compared with certain rickety old bridges, which groan and sway under you at every footstep. There is one in particular of which I have a most vivid recollection. My Balti coolies, five in number, who accompanied me throughout my journey, and who in their own native country are familiar with some of the most execrable bridges in the world, found the particular bridge of which I am speaking too trying for their nerves. Two of them had to be carefully helped over, although it was not more than 15 yards in length. When covered with hard slippery snow, pitted with the irregular frozen footsteps of travellers who had gone before, it was distinctly dangerous. The jagged rocks in the torrent below always seemed to hunger for you to fall upon them. In many instances the bridges simply consist of a single pole or two poles placed side by side; it then requires a good head to cross them. The rope or rather twig bridge common in Gilgit, Chitral, and the Kunar valley is never met with in Kafiristan. The only one of that description with which I am acquainted, is placed every year across the mouth of the Bashgul river by the inhabitants of Birkot, for the convenience of Kafirs trading with them and with the other villages of the Kunar valley. In the Presun country the bridges are remarkably good. They are made on the principle of the dug-out boat from large tree-trunks, and are both easy and safe. They are often elaborately ornamented by the carved heads of animals placed at the end of long poles stuck at intervals along the parapet on both sides. There is one other point which makes travelling in Kafiristan difficult. I remember on one occasion being ludicrously embarrassed by finding my track abruptly stop at the foot of an unscalable bluff. The explanation of course was, that I had reached a wading-place, of which there are several between Kamdesh and Lutdeh. Some of them are of considerable extent and easy enough, except for the sharp stones in the river bed, which are apt, if you are wading with naked feet, to pain you into a stumble and a ducking; but others are actually dangerous both from the force of the water and from its depth. Yet the worst I know was only up to the waist and of short extent, the footway being an under-water ledge at the foot of a precipice. It was very hard to keep close enough to the rock to remain on the ledge, and not be washed out into the raging torrent. At that place dogs had to be dragged through anyhow, and the unfortunate animals sometimes emerged from the ordeal more than half drowned. At all the wading-places, particularly during the snow-melting season, the current is strong, and great caution has to be observed.

None of the passes are easy. They must be tackled according to their altitude, the amount of snow upon them, the season of the year, the time of day, etc. I suffered terribly on the Mandál Pass, but the reason was that the Kafirs gave me credit for being as good a mountaineer and as rapid a traveller as themselves. The result was that I arrived at the last climb late in the morning under a hot sun, and the softened snow not only gave me enormous trouble in surmounting the pass, but afterwards kept letting me through suddenly, dashing my feet against or between the stones concealed beneath it. At one of these mishaps my foot got firmly fixed for a considerable time, while the knee of the free leg was forced up somewhere near my chin. It took strong men, pulling hard, a considerable amount of labour before they dragged me out of my uncomfortable and helpless position.

But I must hurry on to describe the people, their organization into tribes, their manners, customs, etc. The time at my disposal will not allow of my giving much more than a cursory glance at these important points.

Of the origin of the Kafirs I will only say that, in my opinion, it will be ultimately accepted that the present inhabitants of Kafiristan are mainly descended from the old Indian population of Eastern Afghanistan, who refused to embrace Islam in the eleventh century, and fled for refuge to these difficult valleys, where they found ancient peoples, whom they subjugated, enslaved, or partially amalgamated with. These ancient peoples are probably represented at the present time by the Presuns, the Jazbis, the Arams, etc.

I have, I think, conversed with representatives of all the different tribes of Kafiristan, with the exception of a mysterious people called the Ashkun, who, from their inveterate hostility to the inhabitants of all the surrounding valleys, except the Wai people, are really as unknown to the great majority of the Kafirs as they are to me. They live in the district between the Ramgul and the Kulum on the one hand, and the Wai country on the other. From what I have heard of them, they appear to be separated from the Ramgul and Kulum Kafirs by a range of mountains. The rivers which drain their country flow into the united Presun and Kti rivers, a short distance above Chigra Serai. This people is probably akin to the Wai. Many of them are now Mohammedan, as are also several of the lower Wai villages.

In Kafiristan proper there are certainly three entirely distinct languages, besides many dialects. The language spoken by the greatest number is that used by the Siah-Posh people, so called because they affect dark-coloured, nearly black clothing. All the Siah-Posh, however, are not of the same tribe; but although there are dialectic differences in the languages used amongst them, yet they all understand one another readily, and their language may consequently be called the Siah-Posh tongue, a definition which, if not absolutely correct, is at least convenient. The other chief languages in Kafiristan are those spoken by the Wai and by the Presun people, which differ both from one another, and from the language spoken by the Siah-Posh. On this point many Bashgul Kafirs have assured me that any of their number who go to the Wai valley young enough, can easily learn the speech of that people, while no one under any circumstances, and no matter how young, can ever learn the Presun language.

The Presun are certainly unlike all other Kafirs; they are possibly an aboriginal race. I have listened most carefully to their priests and other officials chanting at sacrifices, etc., but I could never learn to repeat nor could remember one single word I heard; indeed, at those religious functions the sounds uttered by the officiating priests seemed to me more like a soft musical mewing, than anything else I can compare them to.

Classifying the tribes according to speech, we have then, first, the Siah-Posh; secondly, the Wai, including probably the Ashkun; thirdly, the Presun.

The great majority of Kafirs are Siah-Posh. The tribes coming under that designation inhabit all the northern valleys of Kafiristan, although they are separated from one another at one point by the Presun valley, as you may see on the map. Amongst those I have called Siah-Posh the chief tribe is known as the Katir. They inhabit the populous west valley which borders on Afghanistan, and which is said to contain between twenty and thirty villages. In that situation they are known as the Ramgul Kafirs, or the Gabariks. To the east of the Ramgul country is the Kulam valley. It only contains four villages. Its main river joins that from the Ramgul valley, and flows into the Kabul river at Lughman. To the east of the Kulam valley reside the Kti branch of the Katirs. They possess but two villages, and one of these is very small. The Kti river, as I mentioned before, joins with the Presun and Wai streams, and falls into the Kunar river at Chigar Serai. Finally, the upper part of the Bashgul valley, as far down as the country of the Mádugál Kafirs, is also occupied by a branch of the great Katir tribe, which is more numerous than all the rest of the tribes in the same valley put together. In the lower part of the Bashgul valley dwell the important Kám Kafirs, with the Mádugál tribe to their immediate north, and the small Kashtán tribe to the west. Still lower down, there is the small village of Siah-Posh Kafirs, quite separate and distinct from all the other tribes. They are supposed to be partly composed of an aboriginal race called the Jazhis. The other chief tribes, the Presun and the Wai, occupy the positions shown in the map. What I have called branches of the great Katir tribe are really distinct and independent communities, but their intertribal organization is probably much the same in each case. Each tribe in Kafiristan is split up into families or clans, and the individual importance of any single Kafir depends entirely on the numerical strength of the clan he belongs to, and upon his own position in that clan. The affairs of a tribe are nominally arranged by the consultation together of the headmen, who are called "jast;" but, as a matter of fact, in ordinary times the business of a tribe falls very much into the hands of four or five of these headmen, or "jast," who are distinguished beyond their fellows for sagacity or valour, but who must also be the possessors of considerable wealth. Indeed, the importance of worldly possessions is very strongly, perhaps too strongly, recognized in Kafiristan. A man may be brave, devoted, and sagacious; he may have spent the whole of his flocks and herds and other property in becoming a "jast;" he may also be of good family; yet, if he be not possessed of considerable personal wealth, his weight in the tribal council is comparatively small, except in the case of an orator, when to a certain extent he may atone by fervid speeches for lack of wealth.

A man can only become a "jast," or headman, by going through a prescribed ceremony, which lasts nearly three years with the Kam tribe; amongst the Katirs its duration is somewhat shorter. During that period he has to banquet the whole of his tribe on eleven different occasions, and entertain his brother "jasts" with ten separate feasts. He has to do this in conjunction with a woman who may or may not be his wife. She generally is not, for the expense of two people going through the ceremonies at the same time is so great, that none but the richest families can afford it. The usual plan is for the husbands to make a private arrangement amongst themselves, by which the wife of one man goes through the ceremonies with another individual, whose wife in her turn will reciprocate by distributing food in conjunction with the husband of the first woman. The woman's sole reward seems to be that she is permitted to attend one or two particular dances, and has also the privilege of wearing Markhor hair round the tops of her dancing-boots. The man, on the other hand, becomes an exalted personage, one of the great men of the tribe. The complete ceremonies for becoming a "jast" are elaborate and complicated. They would be tedious to listen to in detail. In the depth of winter the man grows a miniature field of wheat in his own living room, and this is remarkable amongst the Kám tribe as the only occasion on which a man interests himself or actually works in agricultural pursuits. He has also to wear a particular uniform on appropriate occasions, to make certain sacrifices, appear at the prescribed dances, sleep out at particular shrines, and for one period consisting of several weeks is never permitted to leave his village. It is a very curious custom that, although once a "jast" always a "jast," yet a very wealthy man is practically compelled by public opinion to keep on going through this ceremony again and again, or else he must make his sons and nephews, however young, headmen one after another. Unless he does this he is certain to fail in maintaining his influence and popularity with his fellow-tribesmen. Sumptuary laws are very stringent. No one but a "jast" would dream of wearing a bright-coloured robe at religious dances, nor a gaudy Oriental turban, unless in the case of a well-known warrior of good family, who might be invited to join the dance to complete the number of performers, in which case he also would be decorated something after the fashion of the others. One friend of mine, a plain man, a good but not particularly famous warrior, was, for some reason or other, very desirous of being allowed to wear red trousers. After giving six cows to be eaten by the villagers, this privilege was accorded him, but even then he seemed greatly ashamed of his finery, and always covered up the bright-coloured garment as much as he could with his long brown Chitrali robe. The general idea seems to be that within certain well-defined limits, a man may swagger as much as he likes, provided he pays for doing so by feasting the villagers.

There is a sort of inner circle amongst the "jast," who, by further banquetings, are allowed what is considered the nearly royal privilege of seating themselves on four-legged stools outside a house. In the Kam tribe there were only five men and one woman entitled to this exclusive privilege. Anybody, men, women, children, slaves, may sit on these stools indoors, or on ordinary wooden benches outside, but to be permitted to sit on these queer little four-legged stools in the open air is only allowable to such as are considered "Mirs," or kings, in the tribe, although their royal function begins and ends with the four-legged stool.

For the ordinary management of internal affairs, of secondary importance, there is a kind of elective magistracy consisting of thirteen persons, who are changed annually. Their chief is known as the "Ur Jast," and is a very important personage indeed. The remainder of the number are merely his satellites, and slaves even are elected, as I shall mention when speaking of that peculiar class. The business of these men is to regulate the supply of water to the different fields, and to see that grapes and walnuts are not picked before the appointed time, while their chief is also responsible for the lighting of the fires at the dancing-house every Wednesday night, the commencement of a kind of Kafir sabbath, which occurs every seven days during the time field-work is being carried on by the women. The elected thirteen punish disobedience and other irregularities by fines, which, as they expressively put it, they eat themselves. On appointment their chief has to entertain the whole village. He is also expected to entertain public guests, but as he receives certain contributions in the shape of flour, etc., his office is believed to be as lucrative as it certainly is honourable. Under every circumstance in which a man is in any way exalted above his fellows he has to pay for the honour. For instance, there is a yearly competition in throwing an iron ball, believed to be of sacred origin. A great festival is made of the competition. The victor, instead of receiving a prize for his success, has to feast the whole village. I expressed my surprise at this custom, comparing it with the results of similar competitions in my own country. I was answered that Imra, the Creator, had made that man's arm strong, therefore of course he must give a feast in honour of Imra.

I shall not have time to go into minute particulars concerning the appearance of the Kafir people; indeed, it must be distinctly understood that to-night I deal in generalities only. Of the different tribes I have seen, the Wai tribe appeared to be the fairest, the Presun and some of the Katirs the darkest. In the Katir village of Pshower the inhabitants are almost black, but I subsequently discovered that their peculiar appearance was mainly due to the smoke-giving wood they use for fuel, and to their extreme repugnance to washing. On a certain occasion I found a Presun man who, having escaped from an Afghan master, had made his way to Kamdesh. I noticed that this man had a comparatively fair skin. This bewildered me a good deal, until I saw him a few months later in his own home, when his complexion was just as dark as his fellows'. He possibly, as he lived in a cold country, had not thought it necessary to wash his face in the interval of our acquaintanceship. Speaking generally, the Kafirs are by no means fair, although they are equally removed from the black races. They are darker than many Badakhshis and Chitralis. Their colour is that of the average inhabitant of the Punjab. The lower classes and the slaves are much darker in tint than their betters; their features also are coarser. Red-haired people, or those of a more or less albino tint, are less than one per cent. of the total population. The usual type of feature is distinctly good—purely Aryan. The nose in particular is extremely well shaped. The degraded kinds are either the bird of prey type, or, as in many of the slaves, a flattish nose and coarse features. In some of these lower forms, the hair of the scalp reaches nearly down to the eyebrows, and gives its possessor a most forbidding appearance. Amongst the more important families, some of the men have singularly well-formed heads, and look as if, under favourable conditions, they might become statesmen, philosophers, or scientific men. The chief drawback to the more intelligent faces is the furtive, stealthy look they sometimes have, which is suggestive of shiftiness and insincerity; but the majority are sufficiently frank and bold-looking—in their own country. The women are for the most part singularly unlovely. Little girls are often quite pretty, but the hard field-work and the exposure to all weather the women have to undergo, makes their complexions rough and dark. They are often also appallingly dirty. You are surprised to notice one day how comely a washed face can look, and then you notice it becoming daily dingier and dirtier, until not unfrequently it ends by being absolutely sooty. Then the poor things too often have a tired depressed look from overwork. They age rapidly, as might be expected.

The physique of the Kafirs is magnificent of its kind. They are light-built men, who almost always seem to be in hard training. Fat men are unknown altogether. One day I was speaking to the chief priest on this very point, and was explaining to him how common fat men were in my own country. He looked at me in quiet surprise for a few moments, then his face brightened in a curious way, and he said, "I know very well what you mean. I once killed a very fine man on the Asmar frontier, and he was fat just as you describe." Very few of the older men in Kafiristan are even what might be called stout. Their average height is between five feet five and a half and five feet six. The tallest man amongst the Kám was six feet one and a half. The biggest man of the tribe was half an inch lower in stature. He was an extraordinarily powerful fellow; but, as a rule, the men of medium height are not only the most active, the fastest runners, the most enduring travellers, but are generally the most physically powerful also. The women, with some few exceptions, are of low stature. Very many are weakly-looking, yet their powers of endurance are simply marvellous. They often make extremely long marches, carrying loads.

The commonest dress of the Siah-Posh is a goatskin confined at the waist by a leather strap, which also supports the inevitable dagger. This is the commonest dress on the whole, because it is worn by the poorest classes, who are naturally the most numerous part of any community. I have never seen a goatskin garment worn under any circumstances by a woman. The favourite dress of the fairly well-to-do Kafir male of the Eastern valley is a coarse cotton shirt and trousers, a brown Chitrali or a black Minjani robe, brown soft leather boots, and perhaps also footless Chitrali stockings. The national garment, however, is a tunic, which all women wear without exception, and many men as well. It is made of thick dark brown woollen cloth, and in women reaches from the shoulders to the knee; a wedge-shaped piece of the body in front and behind is exposed owing to the peculiar shape of the garment. It is girdled at the waist by a long dark red flat cord about an inch and a quarter broad, ending in tassels. It has a red edging round the bottom; there are no sleeves, but the upper part of the garment is so fashioned that the wearer often looks, if viewed from the front or the side, as if she were wearing an Inverness cape. The men never bind this tunic tightly to the person as the women do, but simply wear it thrown loosely over the shoulders. The Presun people wear very thick loose grey blanketing clothes, which give them a cumbrous, awkward appearance. The Wai people wear cotton clothes, and affect bright colours whenever they can get them. The Siah-Posh women wear square cotton caps at the back of the head, while the girls confine their locks with a double thread fastened round the head at the level of the brows. The official head-dress of the Siah-Posh women is the curious horned cap, of which you will see a specimen in another room. This head-covering is almost invariably worn by the Katir women, but is only used on important ceremonial occasions in the other Siah-Posh tribes. In the Western valleys the fashion is to have the horns much lower than those worn in the Bashgul valley, but in other respects the head-dresses are identical. One of the chief ornaments of these curious horned caps is a number of common brass thimbles. On one occasion I noticed on one of these thimbles a short English inscription, "For a good girl," or something of that sort; and this is remarkable, for it was the only instance in which I met with written or printed characters during my residence in Kafiristan. The Wai women often wear large drab turbans ornamented with festoons of cowrie-shells, and they are also much addicted to the employment of pretty red and white beads as an additional embellishment to their persons.

Children are always born in a special building on the outskirts of a village. The way they are named is very peculiar. An old woman runs rapidly over the names of the baby's ancestors or ancestresses, as the case may be, and stops at the instant the infant first begins to feed; the name on the reciter's lips when that event occurs being the name by which the child will thenceforth be known during its life. As a consequence of this peculiar custom, it not unfrequently happens that more than one member of a family is compelled to bear the same name. In such cases the children are distinguished from one another in speaking of them by the prefix junior or senior, as the case may be. Kafir men and women are known by their own particular name affixed to that of their father: thus, Chandlu Astán means Astán the son of Chandlu. In the case of very popular names, the grandfather's cognomen has frequently to be employed also to distinguish the various individuals: thus, Lutkam Chandlu Merik means Merik the son of Chandlu, the grandson of Lutkam. Occasionally, though rarely, the mother's name is used along with the father's; so Bachik-Sumri Shiok means Shiok the child of Basik and of Sumri. There is no objection in Kafiristan to a child bearing the same name as its father, as there so commonly is throughout the East; indeed, you constantly hear of Merik Merik, Gutkech Gutkech, and similar instances of father and son bearing identical names.

The most striking mental peculiarities of Kafirs are their extreme cupidity, their extraordinary jealousy of one another, and the intensity of their intertribal hatred. Their cupidity is, indeed, a marvellous sight to witness. A Kafir will come into your house or tent, sit down on a chair or stool, and talk quietly until he begins to cast his eyes round the place. You may then notice in many cases the man's eyes half close, his face flush, and his whole demeanour become an extraordinary example of extreme covetousness. Their jealousy of one another is so great that they are often ready to break out into murderous quarrels even on the mere suspicion that an English traveller, like myself, was giving away presents with partiality. Their intense intertribal hatred entirely deadens their political foresight; and a Kafir tribe is always ready to beg the help of its most inveterate Mahomedan enemy and even introduce him into its territory in order to aid in the chastisement of some other Kafir tribe. Kafirs are quite the reverse of intolerant. At the foot of the Kamdesh hill there are two hamlets, one to the north called Agatsi, the other to the west called Agaru. These tiny settlements are peopled by Kafirs who have changed their religion to Mahomedanism. Their family connections amongst the Kafirs would be just as ready to avenge the killing of one of these renegades as they would be to avenge the blood of a co-religionist of their own family.

The Kafirs are by no means simple in character; they can intrigue, concoct secret plots, and then carry them out with the secrecy and subtlety of the average Oriental. On one occasion a headman of Kamdesh went on a visit to the Amir of Kabul. On his way home, while journeying up the Kunar valley, he was waylaid by some followers of the fanatical priest of Dir and murdered. The man who actually dealt the fatal blow was a Kafir who had embraced Islam. He escaped to Dir, and lived there under the protection of its powerful priest. The headmen of Kamdesh consulted together how the murder should be avenged. Eventually they decided on a plan which shows well the persistency with which a Kafir can carry out a settled resolve. They employed a man to go to Dir to declare himself a convert to Mahomedanism, and to become a follower and disciple of the fanatic who is the head of the Mussulman religion at that place. Their emissary remained in Dir for more than two years before he could, under the veil of friendship and a common religion, persuade the murderer to pay a stealthy visit to Kafiristan, where, of course, he was at once seized by prearrangement and immediately killed. The mental powers of an ordinary Kafir are by no means inconsiderable. I took a lad to India with me who belonged to a poor family, and was of a somewhat degraded type. When we returned to Kafiristan, amongst other presents I handed over to him were some 280 Indian rupees. He begged that, instead of paying him in Indian rupees, I would give him their equivalent in Kabul money. The Kabul rupee is worth twelve and a half annas, while the Indian rupee is worth sixteen. I carefully calculated out the number of Kabul rupees to which he was entitled, and handed them over to him. He at once objected, saying my calculation was wrong. We had an elaborate argument, I appealing to my figures, and he appealing to his fingers and toes, which he used to represent scores of rupees. In the end, he convinced me that he was right and I was wrong. Now, this man was certainly not above the average of Kafir intellect, and he never could explain to me the means by which he arrived at the correct number of Kabul rupees he was entitled to receive. On another occasion I had forgotten the arrangement of letters which enabled me to open a certain puzzle lock. I mentioned the dilemma in which I was to a certain friend of mine—a man who was solely remarkable for his splendid courage and his numerous homicides. He took my puzzle lock in his hand and sat playing with it until he actually found out how to open it, nor did he ever afterwards forget the arrangement of the letters by which that feat could be accomplished. Yet he had never in his life seen a printed letter until I showed him these on the puzzle lock. As a third instance of their remarkable cleverness in many respects; I was showing the priest on one occasion a small conjuring trick, the principle of which, though simple enough, I should have taken many days to discover myself. I had a double tin funnel, which, when the thumb was placed over the narrow orifice, allowed fluid poured in to rise up into a hidden chamber, where it could be restrained or set free at will by the movement of a finger on an air-hole. The trick was to fill this funnel and its secret chamber with wine, which was then all allowed apparently to flow away. Water was then run through the funnel, which was shown to the people, and finally, the finger being removed from the air-hole, the wine was allowed to escape from the hidden chamber, and the spectators were expected to be mightily mystified. On my showing this little toy to the priest, to try to mystify him in the usual way, he quietly sat down on a stool and ruminated for a few moments, and then looking up, explained that he knew all about it. And so he did; he had thought it all out quietly in a few minutes.

The religion of the Kafirs is idolatry, with traces also of ancestor-worship. Imra is the creator of all things, and there are a large number of secondary deities, both male and female, whom Persian-speaking Kafirs have described to me as "prophets." Of these, Moni appears to be the most ancient, and Gish, the war-god, the most popular. There are a large number of other minor deities, also, who preside over women and children, who must be sacrificed to for wealth, and who give fruitful harvests, etc. Special animals have to be sacrificed to particular gods: thus, Imra receives cows, Gish male goats, Dizani a goddess, sheep, etc.; but we shall only have time this evening to speak of Gish, the war-god. He is believed by the Kafirs to have been created in a miraculous way by Imra. He was a marvellous warrior and slayer of men. They assert that he it was who killed Hassan and Hussein, cut off their heads and then played polo with them, just as the Chitrali princes play the game at the present day. After he died, or rather after he quitted this world, his followers divided into two companies. If you are an Englishman, you will be politely assured that the upper classes went to "Lon-don," and the lower orders settled in Kafiristan. Gish has shrines in every true Kafir village, and the corners of his small temples are not unfrequently ornamented with war-trophies stuck on the end of poles. The object worshipped is either a plain stone, or a wooden head and face carved in a conventional manner. On these the priest casts flour, etc., and the blood of the sacrifice. A great feature in the war system of the Kafirs is the sending out of young men in couples or in small parties, who penetrate stealthily into the enemy's country and there try to waylay, or murder in their sleep, men, women, and children. As soon as they have succeeded in their object, they race back to their village with the utmost speed of which they are capable, being often closely followed up for a part of the distance by avenging Pathans. It is always known when one of these successful raiding-parties has arrived, by the songs of triumph they sing when they halt some little distance from the village. If they come back in the evening they generally camp outside all night, singing their song at intervals and receiving the congratulations of their friends. In the morning, arrayed in much finery, with dancing-axes in their hands, they proceed to the dancing-platform, and if they have been lucky enough to bring away some murdered man's clothing with them, they cast it on the ground in front of the rude altar, which is always placed conveniently near. Then, in company with all the women of their family, they start dancing in honour of great Gish. In the intervals of the dance the women shower wheat-grains upon the heroes. The music is supplied by drums alone, as pipes must not play at these Gish observances. If a large raiding-party, a small army, sets out and is successful, there is no dancing to Gish afterwards; nor does it ever take place if the fight has been with fellow-Kafirs, nor if any of the raiding-party have been slain. If you wish to compliment a Kafir, you compare him to Gish; while the prettiest thing you can say to a Kafir woman is to call her "Gish Istri," which means Gish's wife. Besides gods, the Kafirs believe in fairies, and also in devils, who have to be propitiated in order that the crops may not be destroyed. I on one occasion, while making some particular inquiries about Yush, the chief of the devils, found that my friends were very chary about describing him to me. The more my inquiries concerned his appearance, the more embarrassed the spokesman became. At last a thought struck me, and I asked if Yush resembled me—if he were of my colour. "Oh no," was the polite and tactful reply, "he is not like you; he is like the private English soldiers in India." It was in this way that I learnt that the Kafir devil is of a reddish colour. There is a hell in the Kafir theology where wicked people burn. It is situated below the ground, and the aperture which opens into it is guarded by a custodian named Aramallick, who permits none to pass him. The spirit of a dead man becomes a shade, a mere shape, like the phantoms we see in a dream. The religious stories told me were mostly of an infantile description, although some of them were undoubtedly curious. As a rule, however, they are most inconsequential. Kashmir is the most sacred place in the world, because it was the first created country. There is a story of how the world was populated from Kashmir which is not without interest. A confusion of tongues came upon a number of brothers and sisters, the children of Baba (Father) Adam and his wife, who were all sleeping together, so that on waking in the morning a man could only understand the speech of one particular woman; so the company told themselves off in couples who could understand one another, and then wandered away in different directions to populate the world.

Wooden effigies, or a long single stone placed on end, are erected to the memory of dead relations, and although ancestor-worship is denied by the people, I have seen these effigies and monoliths sprinkled with the blood of sacrifices offered by those of the same family who were suffering from sickness, while at a particular festival food is presented to the family effigies, and placed round the house for the use of departed shades.

There are no human sacrifices under any circumstances in Kafiristan, except that prisoners taken in war are sometimes stabbed in front of the coffins to satisfy the indignant ghost of a dead warrior. Kafirs are never melancholy, and suicide is not only unknown amongst them, but when they are told about it they are unfeignedly surprised.

There is nothing in the shape of prayers; the substitutes are religious dances, sacred songs, and sacrifices.

The sacrifices are carried out by the "utah," or priest; the "debilala," the singer of the praises of the gods; and the "pshur," who is supposed to be temporarily inspired on all such occasions; but no goat or other animal is ever killed for food in Kafiristan except in the orthodox way, and with the appropriate ceremonies. At such times any one may officiate.

The priest—the Kamdesh priest is the seventh of his line in regular descent—is a very important personage. He is allowed to sit on the stool in the open air, whether he has gone through the necessary banqueting or not. He is always a man of wealth, and the head of a clan. He gets a double share of each animal whose sacrifice he presides over, and has other rights and perquisites. On the march and elsewhere, he takes precedence of every one. For some particular reason he must not go near the receptacles for the dead, nor even traverse certain paths which lead to those places. Slaves may not approach the hearth of any house he may possess, nor come too near any of the shrines.

The "debilala" is also a man held in high respect; he recites the praises of the god in whose honour the sacrifice is being made, and at the great religious dances in the springtime he has a special place assigned him in the centre of the performers, and alongside of the priest. He also is debarred from using certain pathways supposed to be impure.

The "pshur," is the individual who becomes temporarily inspired during sacrifices and on other occasions, when he frequently behaves most violently, and is sometimes not soothed before some of the headmen have specially appealed to Imra on his behalf. He is on the whole despised by his fellows, who believe that although he is sometimes really inspired, yet at other times he is simply a liar, as they put it in their charmingly direct way. I have watched the proceedings of many of these "pshurs"; those of the inner valley, where there is one to every village, are held in much greater respect than those of the Siah-Posh. I think the majority of these men believe in themselves to a certain doubtful extent. On one occasion, at night, during a visit from the

Kám priest and the "pshur," I gave them some cognac, as a specimen of Western drinks. Shortly afterwards, a quarter of an hour or so, the "pshur" became greatly agitated, turned quite pale, and trembled all over. The priest at once began high-voiced appeals to Imra, but it was a long time before the "pshur" was himself again. The two men did not leave me without giving me all kinds of warnings and cautions. I was not to go to bed till the morning, and I was to be very careful of the kind of food I ate the following day, the nature of which food was particularly mentioned. It appears that while engaged in talking to me, the "pshur" suddenly became conscious that a fairy's head over my doorway was quietly regarding him. The fairy observed that he or she had come from "Lon-don" to inquire if the "Frank" were there, and on receiving what one would suppose was a somewhat superfluous answer, the fairy gradually faded away.

On another occasion, another "pshur" having a bad cough, I shared with him some opium pills I was using myself for a similar complaint. The result of the opium on the man was, that he was terribly possessed during the day, and jumped and shouted and played all manner of antics. He was, I think, partially deranged in his intellect. He was also a terrible homicide. We were on the march at the time, and all the Kafirs we came across appeared to fear my companion greatly, glancing at him with dislike and distrust. The Kam pshur, who, by the way, was a great friend of mine, was disestablished, disendowed, and kicked out of the tribe on the occasion of two young men getting killed while engaged on a raiding expedition. I suppose he had given a wrong prediction, for when the boys' heads were brought in for the funeral ceremonies, he was ordered to clear out at once and return to his own tribe. It appears that the Kám, having no inspired person of their own, had imported this man from the Mádugál Kafirs, otherwise I do not see how the Kám people could have got rid of him. Once I was greatly embarrassed by one of these "pshurs" having, during his period of inspiration at a sacrifice, set all the Kafirs of the Bashgul valley raiding another Kafir tribe with whom up to that date they were on terms of friendship. Besides the functionaries I have described, there are others who perform certain subordinate duties in relation to the gods. For instance, supposing there is excessive snow or rain, the people collect together in some particular house, and that one of the "jast," who alone can perform the ceremony, binds a piece of cloth turbanwise round his brows, takes a bow in his hand, and after purifying it by the sprinkling of water, proceeds to discover which of the gods is willing to receive a sacrifice. He finds this out by rapidly running over the names of the gods until the bow begins to swing backwards and forwards. The name of the god on his lips when the movement begins is the name of the god desirous of being sacrificed to. An amusing circumstance occurred in this connection on one occasion. The god Aram had consented, in the way I have just described, to accept a goat offered in the hope of stopping the excessive rain and sleet, but the weather began to clear even before the god's name was given out. On that the prudent giver of the sacrifice postponed his offering, in the hope that he might be able to cheat the god of his due. The priest was excessively angry, and told me the weather would grow worse and worse. I could not help smiling at his apparent earnestness, but by one of those curious coincidences which are the stock in trade of all mystic impostors and other quacks, the weather did get terribly bad, and I was nearly drowned out of my house. I remember two other occasions where a sacrifice was immediately followed by the complete cessation of the natural phenomena by which it was directed.

The mode the Kafirs have of disposing of their dead is peculiar. They are not buried nor burned, but are deposited in large boxes, placed either on the hillside or in some more or less secluded spot. In some few places, notably in Lutdeh, these coffers for the dead are placed just above and close to the village, on the level ground and alongside the road. When the wind blows from that particular direction the result is simply appalling. The boxes are very large, and usually body after body is put into them, as long as the wood resists the natural decay due to time and the weather. Certain great men are occasionally, I think, given a box all to themselves. Only in one or two instances have I seen flags placed by the boxes, or pieces of bright-coloured cloth draped on them. The lid generally has several largish stones placed on it, possibly to prevent its warping and exposing the contents of the coffer. Ornaments, silver earrings, etc., and bright-coloured clothing are sometimes deposited with the dead, as are also wooden bowls containing bread broken up in clarified butter. When through age the woodwork decays, the bones of the dead are exposed, and very little attention is paid to the circumstance.

The funeral ceremonies are most elaborate in certain instances. A little girl who died at Kamdesh was dressed in decent cotton grave-clothes, her relations being wealthy people, and the body was simply carried in a blanket by four men to the cemetery without any ceremony of any kind; a string of weeping women followed behind in pairs or singly, the nearer relations being supported by female friends.

The dead wife of a headman, who had herself gone through the ceremony of banqueting the people, was treated with much greater honour. Placed on an ordinary Eastern bed, and decked out with all the finery the family could muster, with festoons of wheat ears to indicate her liberality during life, the body was held shoulder high by slaves, while the nearest female relatives sat wailing on the ground beneath it. One of them—the only daughter—stood with one hand on the bed addressing her dead mother. Then the band struck up, and a curious dancing scene was presented. Immediately round the corpse was a circle of women, who edged round from right to left, giving a funeral gesture with the hands shoulder high. This gesture is made with the hands upright, the fingers extended. It consists in jerking the hand rapidly, so that the palms are one instant directed towards the dead body and the next towards the performer; its meaning is supposed to be, "she has gone from us." Outside the circle of women was a circle of men, dancing singly, but much more energetically, and also going sideways. They made a similar gesture to that used by the women, except that the hands, instead of being held at the level of the shoulder, were whirled round at the level of the brows. Outside this second circle were ordinary men-dancers, stamping round mostly in pairs with arms round each other's shoulders. In the intervals of the music the bed was placed on the ground; the chief mourner, sitting on its edge, looked into her dead mother's face, and filled the air with lamentations. She could hardly be prevailed upon to stop sufficiently long for one of the tribal orators to shout out breathless staccato sentences praising the dead woman, her liberality, and the family to which she belonged. All the time wine and food were being handed round to all the spectators. Afterwards the band would strike up again and the dancing be resumed, and so on all day. In the case of men killed in war, or when famous warriors die, the ceremonies are extremely elaborate. On one occasion, two youths, friends of mine, were killed in a raiding expedition. As a kindly act to the bereaved families, the heads were cut off by a friendly tribe and brought into the village, being met and received by a great crowd of lamenting women. The fathers of the poor boys simultaneously cast themselves from their housetops, injuring themselves severely. Straw figures, gorgeously clothed, were attached to the heads, and each on a separate bed was taken to the dancing-platform, where dancing, orations, etc., were continued for two or three days. Then the heads were placed in the boxes in the cemetery, and further observances were carried on with the straw figures alone. Each villager on arriving on the platform invariably went through the action of kissing the dead about a yard off. Large quantities of food and wine were distributed continually. When the throng went away to rest, the figures were consigned to the charge of the women, who sobbed out adjurations to the dead, while at intervals wise old women one by one chanted their genealogies. The orations were made most dramatically. The speaker would step forward to the foot of the bed to gaze an instant at the dead faces, then cover his own face with his mantle and burst into sobs and tears. He would begin addressing them by name in a broken voice, until, recovering himself, he would eloquently praise their bravery, their manliness, as worthy of the families from which they sprung.

A famous warrior died in a distant village while I was at Kamdesh. The corpse was brought in sad procession to Kamdesh, preceded and followed by weeping women. A large number of guns were fired off, both by men in the procession and the men of the village, and the firing was continued on subsequent days. The ceremonies were much the same as those for the young men, only more elaborate. After the body had been committed to its last resting-place, the following day its straw effigy, lashed to a bed, was danced violently round and round, or shaken violently up and down in time to the drumming and the stepping of the dancers, who honoured themselves and the dead by a display of extraordinary agility. Warriors arriving at intervals during the dance deposited for a time their shields on the bed by the effigy, to indicate their respect for the famous fighter.

After a death the house is purified by water, but the priests will not enter it until the wooden effigies of the dead have been erected. This is done after an interval of a year. These effigies are of all sizes and of various degrees of magnificence, according to the wealth of the deceased family. A very large fine effigy necessitates the feeding of the whole village for several days, while a simple flat affair may cost one banquet only. At the time appointed the wooden figure is carried to the dancing-place, and, if not too heavy, is itself danced on the back of a slave. There is an inner circle of women, who dance round it sideways, and use a certain gesture with the hand held breast high. The hand is half bent, palm upwards, and alternately pointed in a half-circular sweep, first towards the effigy, and then back again towards the performer. This gesture is supposed to mean, "As he or she now is, so shall I become also." Of the other dancers, the men, who are entitled to the privilege, deck themselves out in their most gaudy raiment, while flags are also carried round and round in the moving throng. In one instance a bowl was twirled high by one of the women, to indicate that the deceased—a woman—had been most liberal during her lifetime in giving feasts. Some of the sights seen during funeral observances are highly fantastic. Such, for instance, as a sobbing man, the tears running down his face, yet dancing and capering most energetically.

There are no blood-feuds amongst the Kafirs such as those so fatally common amongst their Afghan neighbours. The penalty for killing a fellow-tribesman is, however, extremely severe. Kafirs are continually quarrelling amongst themselves, and the danger to his family of one man killing another is so well recognized and understood, that men, women, even children, are prepared at all times to throw themselves recklessly between the combatants and try to separate them. It is considered an act of virtue to do this. In these incessant quarrels dagger-wounds are very common, but they are almost invariably inflicted on the hands of those who are trying to separate the quarrellers, and who rush between fighting men with the greatest intrepidity. If a Kafir kill another, he must at once leave his village and become an outcast. His house or houses are burnt by the dead man's family or clan, and his property plundered. He must nevermore return to his native village except by stealth, and whenever he encounters any member of the dead man's family, he is obliged at once to hide himself in bushes or behind doors, etc. The stigma applies not only to the man, but to his direct descendants and to his children in law. There are several villages which may be called cities of refuge in Kafiristan, where slayers of their fellow-tribesmen reside permanently. They can only be released from their outcast condition by paying down a heavy ransom to the dead man's family. The ransom is so heavy that it is very rarely paid. Indeed, to pay it shows so much wealth and honour, that the man himself and his descendants, when they return to their village, always afterwards carry a specially shaped axe to indicate their social importance. Concerning this question of men killing one another, I have frequently asked Kafirs what would the result be if a man were to slay a fellow-villager while defending his own life from an attack? The answer was invariably the same. The homicide —justifiable homicide as we should call him—becomes at once a "chile," that is an outcast. On my attempting to argue the justice of this, they always made the same reply: the man should have defended his life without killing the other man. This way of avenging a murder is extremely suitable to the small Kafir communities, where the life of every single man is of the utmost value as a factor in the fighting strength of a family or a tribe. For it is obvious that if the custom, "a life for a life," prevailed, the tribe would lose two fighting men instead of one whenever a man was killed in a domestic or village quarrel.

There is little or no ceremony about a Kafir marriage. A man who is enamoured of a young woman, or wishes to get married, sends a friend to the father of his would-be bride and asks her price. It is nothing more than that. If he is an ordinary poor man, he will have to pay eight cows, while if richer he may have to give as many as twelve or sixteen. If the father entertains the proposal of the suitor, he sends back word to that effect, and the man immediately goes to the woman's home, where a goat is sacrificed, and that constitutes the whole of the ceremony. They are then considered married, but the woman remains in her father's house and works for her father only, until the last penny of her price is paid by her husband. Divorce is easy. It appears to simply consist in a man selling his wife to some other man. Kafirs are polygamous, and usually have from one to four, or at the utmost five, wives. When a man dies, his wives revert to his family, and are either sold or retained by his surviving brothers.

I regret that the time at my disposal has not permitted of my entering into more details concerning the manners and the customs of these interesting people; that I have been unable to describe their domestic life, their slaves, their villages, their houses, their shrines, and particularly that I have not been able to give you a description of the curious inner Kafiristan valley, where there is a great temple to Imra famed throughout Kafiristan—a mysterious hole in the ground, to look down which means certain death to any one, and a wonderful iron bar and sacred stones, which were placed in their present position by Imra himself! In that valley the Kafir houses, instead of being raised two or three stories above ground, descend an equal distance below the ground. There everything appears to be even more strange, fantastic, and unreal than in the Bashgul valley, which always lingers in one's memory as a "faëry lands forlorn." When I first went there I almost believed I had at length landed on Sir John Mandeville's Valley of the Devils; but the people are singularly interesting, and if it cannot be honestly affirmed that truthfulness and frankness are their special characteristics, they are at any rate far more truthful and honourable in their dealings than their immediate neighbours. They have strong family affection; they are devoted to one another in war, and are capable of performing the greatest acts of self-sacrifice, especially in fighting, where I have known a youth, little more than a boy, deliberately stop behind to help a wounded friend, with the absolute certainty that he would himself be killed. He was killed, and to the credit of the Kafirs it may be said, that no one of the tribe expressed the slightest surprise at this act of self-devotion.

Kafirs are naturally boastful, and in their anxiety to impress a stranger with their bravery or their importance in the tribe, do not hesitate to utter splendid mendacities. Most of the early information given me was false from beginning to end, and I still grudge the labour involved in recording it. Yet they are a brave, independent people, who have maintained themselves for centuries against hordes of enemies, not only by reason of the extraordinary difficulties their country presents, but by valour and their magnificent fighting powers. They are entitled to the respect every one must feel for real men, who will fight to the death rather than accept the yoke of the stranger.

Before the reading of the paper, the PRESIDENT said: We are assembled this evening to hear a paper by Mr. Robertson on his journeys in the interior of Kafiristan. Many of us remember the deep interest taken ten years ago in the paper read at that time by Mr. Macnair, who had penetrated to the borders of Kafiristan, and we are very glad to see here present this evening Lord Aberdare, who was President on that occasion. We remember, also, the interest that was taken in the discussion kept up by Sir Henry Yule and Sir Henry Rawlinson, and others learned in everything concerning that part of the world. Unfortunately, we have not present here so many officers as we had then, who are conversant with the question. Sir Peter Lumsden is in Scotland, and I am sorry to say my old comrade and tent-mate, Sir William Lockhart, is also, to his very great regret, unable to be present this evening. We have, however, present with us Colonel Tanner and one or two others.

After the reading of the paper, the following discussion took place:—

The PRESIDENT: The presence here this evening of our old President, Lord Aberdare, reminds me that ten years ago the late Mr. Macnair conducted us to the very threshold of this region, and introduced us to some Kafirs who I find now are not the right sort. Possibly Lord Aberdare may care to remind us of what we learnt that evening; if not, I will ask Colonel Tanner to tell us something of his attempt to reach the land of the Kafirs.

Colonel TANNER: I am a kind of failure. Mr. Robertson succeeded in penetrating and seeing the greater part of this country; I have never been there at all. However, as I have been on the west and the south, I can say a very few words of what I did see on the west when accompanying Sir Samuel Browne's field-force. We penetrated to the Lughman valley, where the whole of the Kafiristan mountains, deeply clad in snow, appeared in our front, distant about two days' march, enticing to look at, but of course, being in an enemy's country, none of us were allowed to go there. On another occasion I came back from Jellalabad in disguise to Aret, a semi-Mohammedan country on the borders of Kafiristan. Unfortunately, here I fell sick and had to return, and that is all I have to say about myself. I would refer to the account of Captain John Wood, who penetrated many years ago to the source of the Oxus, and while at Faizabad came several times in contact with Kafirs. For a great many years Captain Wood's account was all we possessed, until Mr. Robertson appeared before us to-night. Very little trustworthy evidence has been forthcoming about this interesting people, and I congratulate Mr. Robertson very much on the paper he has read and the beautiful pictures he has shown. I hope Mr. Robertson will receive your heartfelt thanks for having performed such a very perilous journey.

The PRESIDENT: I can only again express my regret that we have not among us this evening Sir Peter Lumsden and Sir William Lockhart. They could have told us of what they knew of the Kafirs, the one having accumulated much information in 1867, and the other having actually penetrated into Kafiristan for a short distance; but Mr. Robertson has opened to us an entirely new country. I remember that Sir Henry Yule said, on the occasion of the reading of Colonel Tanner's paper, when Kafiristan had been explored the Geographical Society had better shut up its doors. But I maintain that that is far from being the case. Many countries in all parts of the world are entirely unknown to us. The existence of Kafiristan has been known since it was first mentioned by Major Rennell in his 'Survey of Hindustan,' more than a hundred years ago. It was supposed to be inhabited by people of great interest, more or less descended from some of those Macedonians brought into Central Asia by Alexander and his successors. Mr. Robertson has, in the tea-room, a vase or utensil of some kind which has a Greek inscription on it; and I remember that Mr. Macnair picked up, in a ravine to the south of the Kunar valley, a gem of some kind which Sir Henry Rawlinson pronounced to be Babylonian, and which was almost certainly left there by some soldier in the army of Alexander the Great. These theories and ideas have always given an intense interest to this country of Kafiristan. Therefore, I think you will heartily join with me in a vote—and most cordial vote—of thanks to Mr. Robertson for having opened this country to us, and having given us an exceedingly interesting account of its inhabitants.

ON THE RIVER TELUBIN.*

By HENRY LOUIS, A.R.S.M., F.G.S., etc.

THE least-known portion of the Malay peninsula is the north-eastern angle within which lies the principal part of what are known as the Siamese Malay states, a number of semi-independent Malayan states tributary to the King of Siam; of all these little known states, the least known is perhaps that of Telubin, or Sai, which was till quite recently an unknown name to European geographers. Attention was first directed to it some years ago, when an American vessel foundered off the mouth of the river Telubin, and the sailors who managed to reach the shore were hospitably received by the Rajah of Telubin, and ultimately sent back to America in safety. It has also been known for some years that at a place in the interior, presumably near the headwaters of the Telubin, there were a number of rich goldmines worked by a colony of Chinese. Several attempts were made by Europeans, and within the last few years in two cases, at any rate, with success, to reach these mines, but on both these occasions an overland route was adopted. The river Telubin thus remained unexplored, and I have every reason to believe that no Europeans had ever ascended or descended this river previous to the time of my expedition. Although my object was not directly geographical, but was simply the investigation of the above-named mining area and others not far distant from it, yet the fact of my traversing an extensive range of country that no white man had hitherto penetrated, induced me to carefully map my route and the salient features of the country as far as the thick jungle, with which it is everywhere covered, would admit of. In the present paper I shall, of course, only attempt to give the geographical results thus realized, without reference to the mining matters which were the immediate objects of my expedition.

In the first place, a brief account of the history of this country may not be without interest. At various times the Siamese overran and conquered the entire Malay peninsula, even as far, it is said, as Singapore, and the rulers of most of these Malayan states were tributaries of Siam; yet in these states their rule was never so firmly established but that their turbulent Malayan subjects were constantly revolting against it. Ultimately, it would seem that all the Malayan states south of about lat. 5° N. became independent of Siamese rule, whilst those on the northern side of the great east and west mountain range that crosses the peninsula at about this degree of latitude remained tributaries, yet with a large measure of independence. The Siamese dominions proper then extended, and still extend, as far as the isthmus of Kra, and on the southern portions thereof the Siamese were constantly engaged in petty conflicts with the brave and warlike Malays, who were their titular subjects. Up to that time (before 1800), the north-eastern seaboard was occupied by three great Malay sultanates, namely, Patani, Kelantan, and Tringganu. The Sultan of Patani, then probably the most powerful of the three, made attempts at various times to throw off the Siamese yoke; there was one in about 1775, and a final one apparently about 1820, when, by pursuing their usual policy of fermenting internecine disturbances and calling in the assistance of other Malayan states, the Siamese, although far inferior to the Malays in physique, courage, and fighting qualities generally, thoroughly subdued the Patani Malays. Very many of the inhabitants were carried off to Siam and forced to settle there, forming considerable colonies on the Klong Kut Mai, not far from Bangkok. At the same time the state of Patani was split up into a number of smaller states, the new state of Patani thus formed being one of the smallest. The other new states, thus created, are Tojun or Nongcheh, Jambu or Jering, Telubin or Sai, Jala, Lege, and perhaps also Tiba, although I am doubtful whether this state and the powerful inland state of Reman ever formed part of the old state of Patani; the latter, at any rate, seems probably to have had an independent existence before the time of the division. The curious semi-independent Chinese state or colony of Tomo or Hulu Sai (the headwaters of the Sai or Telubin), which is still in some respects looked upon as forming a portion of Lege, must also be included in the above list.

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* Map, p. 288.

It is a curious and noteworthy fact that the Siamese, the least warlike to all appearance of this group of nations (not even possessing a national weapon), have succeeded in the long run in defeating, and even in most cases in retaining a mastery over the various nations that border upon them; they seem to most thoroughly realize the value of the classic maxim, "Divide et Impera." As regards the Malayan states, the Siamese have fairly consolidated their power; all the smaller states above mentioned, as well as the larger ones of Kelantan and Tringganu (together with several others, such as Keda, on the western side of the Malay peninsula), are now tributary to Siam, paying a triennial tribute. These states are administered by a viceroy, the Chakun of Singgora or Songkhra, the town of which name, admirably situated, was founded and fortified by the Siamese king, Fia Tak, about 1780, and is now practically the capital of the Siamese Malayan states.

In my map I have indicated as well as possible the boundaries of these various states, my knowledge of their position and direction having been gathered from the statements of the native chiefs and authorities. Where so much of the country is dense jungle, unexplored even by its Malay inhabitants, the precise location of a boundary is as impossible as it is unimportant. All Malay villages are on the banks of rivers, and, as long as they know to which rajah they owe tribute and allegiance, the question of inland boundaries does not trouble them. The worst that could happen would be that tribute might be demanded by the wrong chief; and as this would probably lead to a little promiscuous fighting and marauding, with perhaps the killing of a few Chinamen thrown in, it may be surmised that the average Malay would not regard it as an altogether unwelcome interlude, seeing that the Malay loves fighting as much as he hates work, and that it is not by any means an unusual thing to find a perpetual feud subsisting between neighbouring villages or districts, which, even when smouldering, needs but the slightest breath to fan it into active flame. All the rajahs of these Siamese Malayan states have to renew an oath of allegiance to the King of Siam twice a year in certain specified places, this oath taking the form of drinking water in the presence of certain priests and officials, either personally or by proxy, whilst they also have to pay triennial tribute in the shape of a tree of gold. These trees are of various sizes, between one and three feet in height, very neatly made; the stem and branches consist of stout gold wire, to which the leaves, made of thin plates of gold, are fastened. Their value is not very great, as I estimate the weight of the largest one I have seen at about twenty ounces; but they are always accompanied by tribute in kind in the form of gold, buffaloes, elephants, etc., the value of the tribute being proportioned to the importance of the contributing state; it is probably somewhere between $5000 and $15,000 for each state paid once every three years This tribute has to be sent to the viceroy, the Chakun of Singgora, whose duty it is to transmit it to the King of Siam.

The reason, apparently, why the tribute takes this shape is that most of the transactions in this region are still carried on by means of barter. Such currency as there is, consists of old Spanish and Mexican silver dollars, which have been introduced by the ubiquitous Chinese, who are settled and carry on trade in all parts, and of small coins known as "pitis," coined by the rajahs of the respective states. Specimens of these coins are here shown. They are made of an alloy of lead and tin, about the origin of which I shall have something to say later on. They are cast in stone or iron moulds, and their value varies in different states from 1280 to 960 to the dollar. I always had the greatest difficulty in getting the natives to accept either the Japanese yen or the Straits Settlements fractional currency, and, in fact, it appeared to me that it was only the Chinese settlers who had any idea at all of the value of these latter coins.

Of all the above-named district my explorations were directed principally to the Telubin valley, although I also traversed some portion of the valleys of the Menara and the Kelantan on the east, and the Patani valley on the west. The Patani valley is fairly well known, owing to the fact that an English company was working a mine of silver-lead some distance up this river about a dozen years ago; there was a comparatively large staff of Europeans engaged at these galena-mines (which had ultimately to be closed down), and in consequence the river Patani has been fairly well mapped. In the course of my journey I made a few additions to our knowledge of the geography of this valley, but most of my map is taken from the careful surveys of it made some years ago by my late partner, Mr. H. M. Becher, who, it may be remembered, unfortunately lost his life in attempting to penetrate into the unknown country on the south-western borders of Tringganu.

I started from Singapore on the morning of the 16th of August, 1890, in a steamer bound for Bangkok, but which had arranged to go out of its course so as to take me and my expedition to Singgora. I had with me two European assistants, one of whom was an excellent Malay scholar, and two Chinese servants.

We reached Singgora at 4 p.m. on the 18th, and slowly worked our way to a safe anchorage inside Pulo Tikus; with some difficulty we managed to get boats from Singgora to take us ashore. The town lies on a narrow promontory that juts out northward from the mainland, enclosing a very extensive bay, which is almost completely land-locked by it, there being only a small and very shallow channel between this bay and the open ocean, the average depth of this channel being probably under six feet. Steamers accordingly cannot enter this bay, which is not even accessible to tongkangs (native boats) of any size.

Singgora has been repeatedly described, as it has been several times visited by Europeans. It is only distant from Singapore some 500 miles, and is a typical Siamese town. On approaching the shore, there is an excellent landmark in the form of a Siamese temple, or "watt," which occupies the summit of an isolated conical hill close to the town, known as Tan Kwan. The "watt" is reached by a good flight of stone steps up the side of the hill; halfway up there is a small paved plateau, where another "watt" is now being erected under the orders of the King of Siam, the original temple being about thirty years old. It may interest navigators to know that I roughly determined the height of the apex of the "watt" as 350 feet above sea-level; it has the usual shape of a small square building, surmounted by a spire tapering to a fine point. This hill, crowned with the white spire of the temple, makes an admirably conspicuous landmark, visible far out at sea.

The town of Singgora proper is enclosed by a wall of rubble stone, laid in lime mortar, some 15 feet in height. The space enclosed by it is a rectangle about three-quarters of a mile long, and say one-third of a mile wide; only a portion of this space is occupied by houses. The wall is pierced by several gateways, the principal one being a very handsomely built and massive stone frame, with wooden doors quite 25 feet in height. On that side of the wall which faces the inland bay already referred to, some half a dozen guns, in an advanced stage of decomposition, propped up by crumbling wooden carriages, are mounted. As old iron their value is somewhat problematical; in all other respects it is nil. Fortunately, no one seems to have the most remote intention of firing them. The chakun's palace is enclosed by a wall, which forms a continuation of the walls of the town, and lies at the north-west angle of the enclosure. Just in front of it is the court of justice, in which sits, during stated hours, the governor or his deputy, in order to hear complaints and administer the law. Close to this, again, is a thatched building forming the police station, whilst immediately opposite a large gang of convicts, heavily ironed, were at work building a new market-place. They were probably kept at work in this particular spot as a salutary warning to all would-be law-breakers, but I could not help thinking that justice administered to the inharmonious accompaniment of clinking manacles might possibly be somewhat harsher than it would be under more genial influences.

The principal street of Singgora runs for nearly the whole length of the walls close to the front abutting on the bay. It is of beaten earth, cemented, and is lined on either side with good shops and houses built of bricks, plastered, and tiled. The architecture of the town is of the usual Siamese type, modified by an infusion of a distinct Chinese element. At the lower or southern end of the town are some houses built of mud and bamboo, with "atap" (palm thatch) roofs, in the usual Malay fashion. These shops are kept for the most part by Siamese, and some few by Chinese, the principal articles exposed for sale being small hardware goods, cloths, and eatables, most of which, whether of European or Chinese production, are imported from Bangkok. At right angles to the main street are cross-streets leading outside the city wall, which is pierced by numerous gateways. Running closely along the outside of this wall is a narrow street between it and the bay, consisting of small Chinese houses and shops for the most part. It is in this street that the bazaar is held every afternoon, and the motley crowd that throngs it is perhaps the most interesting sight in the place. The bulk of the people are, of course, Siamese in their gaudy silks, Chinese in their invariable costume, a fair sprinkling of Malays (very few of whom seem to be of pure Malayan origin), and an occasional Kling or Arab, whilst here and there Siamese priests, in their curious saffron-coloured robes and close-shaven heads, are seen stalking through the crowd, every individual of which is bargaining away as though for dear life at the top of his voice, excepting only the priests. These priests receive no salary, are never allowed to be in possession of any money, and live entirely upon charity, going round every morning from house to house to collect contributions of food from the inhabitants of the town (irrespective, apparently, of the nationality of the latter). I estimate the entire population at some 5000, but it is difficult to arrive at even an approximately accurate idea. Singgora is said to have existed during the reign of six Kings of Siam, so is by no means an old town, though now a very thriving one. There are a large number of houses outside the town, lining the shore of the bay. Beyond this, and close to the point of the landspit on which Singgora stands, is a small fort, looking like a little Martello tower, nearly hidden amongst Casuarina trees. I could not, however, see that there was any artillery in this fort, although it is evidently intended for that purpose.

The great bulk of the inhabitants are Siamese; next in importance come the Chinese, who all speak Siamese fluently. In fact, Siamese is practically the only language spoken here, there being very few that understand Malay. A large trade is done with Bangkok, the principle articles of import and export being padi, some little live stock, dried fish, damar, birds' nests, and other native products. Singgora is the main collecting and distributing station of this part of the world for the products of the Siamese Malayan states, and tongkangs are constantly engaged in going between it and Patani, Kelantan, and Tringganu.

There are no manufactures carried on here of any importance, except by a small colony of Chinese gold and silver smiths, who seem to supply many of the neighbouring states.

I had hoped to find the Chakun—the Siamese viceroy—at Singgora, but he was absent on a tour through the Malayan states, so I had to go on to the nearest place to where he was, namely, to the mouth of the Telubin river, by sea. With considerable difficulty I hired a Chinese boat with a crew of four men to take my party and myself—including, of course, all our stores and supplies—to the Telubin, which was to be the real starting-point of my expedition. Although the distance is by no means great, it took us forty-eight hours before we anchored in the mouth of the Telubin. This river has, like most others on this coast, a rather formidable sand-bar, and it is not a very easy matter to enter it; of course, in the north-east monsoon it is an impossibility.

The present capital of the state of Telubin, or Sai, known as Selindong Bayu, the residence of the Sultan of Telubin, is about a mile from the mouth of the river. It consists of an irregular assemblage of native bamboo houses, built in the customary Malay style, and seems to do very little trade of any kind. It is almost hidden in groves of cocoa-nut palms, the fruit of which, together with padi, which is extensively cultivated, are apparently the only local productions.

I spent several days here in examining the surrounding country, and principally in investigating the course of the Telubin river, which is a very curious one, and exhibits distinct proofs of the geologically recent origin of the present coast-line, while the sea is gradually receding, the whole being an excellent example of a delta in process of formation. In the first place, the river splits into two distinct branches, some 15 miles from the coast, each of these branches having its own separate mouth. The Telubin proper is the northerly one, the more southerly one being the Sa, or Sai. The latter used, till some fifteen years or so ago, to be the more important one, but about this time its mouth silted up so much that only canoes could cross the bar; upon this the rajah transferred the site of his capital to its present position on the northern mouth. These two branches are also connected by another branch, which runs approximately parallel to the sea coast and not far from it, and there are other minor streams branching off in all directions, forming a regular network of waterways, all of which can be traversed by canoes. Their value to the natives is thus incalculable, and it is difficult to see how communication could be carried on were it not for these convenient watercourses, as all the country is under water during the wet season, and there are scarcely any elephants in the state. These animals form the only means of land transport, capable of carrying loads through the swamps which abound in every direction. The few elephants there are, belong to the rajah, who is, however, not above hiring them out for a handsome consideration—at any rate, to Europeans. The Malays here being practically amphibious, and passing fully half their lives on or in the water, it happens that the entire population is confined to the banks of such rivers as these skilful boatmen can navigate, and whenever a Malay cannot paddle his canoe up or down a stream, it will be quite shallow enough for him to walk along its bed, so that its utility as a roadway remains unimpaired. One consequence of intercommunication being practically confined to the rivers is that there is comparatively little need for elephants; these are, accordingly, not kept in a state of complete domesticity as in India, but are always half wild. Caught young, they are tamed by a very rough process, in which noise seems to form the principal element. The unhappy captive is tied up to stout posts driven into the ground, and then the rajah sends a troupe of his actors and actresses, all of whom are slaves of the rajah, and a ceaseless performance, accompanied by a chorus of shouts, and by music produced chiefly by beating drums of various sizes and by knocking two sticks together rhythmically, is kept up day and night for some weeks. It was once my misfortune to be lodged in the house of a rajah's prime minister whilst an elephant was undergoing the above taming process, and of course such an important operation had to be carried on under the surveillance of this high official, and therefore conveniently near his house. I can only say that it may (and does seem to) tame elephants, but it will nearly drive a European mad. During this time the mahout who is to have charge of this particular elephant, attends on him and feeds him until the beast gets to know him well, and ultimately the elephant is broken in sufficiently to be put to work together with the others. Then, when there is no more work for them to do, the herd is turned into the jungle, their mahouts keeping, however, near them, and being ready to hobble them should they try to wander too far. As a rule, however, they keep to one patch of jungle, in which their keepers always know where to find them. In consequence of these long intervals of rest, during which they practically relapse into their savage state, these Malayan elephants are never thoroughly tame, and are frequently vicious, so that riding them is by no means a safe or an easy mode of journeying. It is, however, the only possible one when it becomes necessary to travel in any direction where there are no convenient rivers.

Before leaving the river system of the Telubin, I ascended a small branch of it, known as the Bigor. This stream, which is about 15 miles long, takes its origin in a small range of granitic hills, which rise out of the plain to a height of perhaps 500 feet. It is probable that this granite contains disseminated cassiterite, as there are alluvial tin workings at the foot of these hills in the headwaters of the Bigor river, the district being known as Klabar. The tinstone occurs here in small patches of gravel on the banks of the streamlet, lying on a granitic bed-rock, and is worked in an intermittent, shiftless kind of fashion by the natives.

Klabar is a very small state, the population being said to be about 500. It is not under the control of the rajah of Telubin, but of a separate chief, a Siamese. Most of the inhabitants are Siamese, or of Siamese descent, and most know very little Malay. There are also a Siamese "watt" and some Buddhist priests; in fact, it is a little Siamese colony, which has probably been established here as a kind of outpost for political purposes.

After thoroughly exploring the delta of the Telubin, I proceeded on elephant-back to the capital of Lege, a place known as Tanjong Mas. On the road we passed through a Malay village, known as Jeringo, which had at one time been the capital of the state of Sai. There are here the remains of an old brick-built palace, which must have had at one time a rather fine gateway. It is said to have been left by the present rajah some twenty years ago, and is now in a state of extreme decay. It must not be forgotten that in this tropical region, with its heavy rainfall, and with a population who have no idea of erecting any permanent structures, years do as much in reducing a building to ruins as would centuries in Europe.

Jeringo is close to the boundary of the state of Lege, and as a consequence the Lege people are frequently in the habit of making incursions into their neighbours' province for the purpose of stealing any of their goods that they may come across, and more especially their buffaloes. Accordingly, the Jeringo men always keep their buffaloes which form practically their sole possessions, underneath their houses—which are, like all Malay houses, built on piles from five to eight feet in height—after nightfall. The stench and filth of this miserable village as a consequence of this practice are something indescribable. It is no wonder that the inhabitants are—as I saw before I left this part of the world—continually subject to epidemics of small-pox, that play fearful havoc with the population, at times absolutely depopulating whole districts. I have been through villages where there was not a single house but had one or more of the family struck down by this disease, and have seen others deserted completely, not a single inhabitant being left, the few survivors having apparently migrated to some other spot.

All the Malays in this part of the country have a great reputation as valiant fighting men, and are extremely skilful in handling the kriss. They are also accomplished "caterans," as the following anecdote will show. On one occasion I wanted a blacksmith, who had a great local reputation, to show me how he tempered his krisses.* He consented, and prepared to go to work, and the first step consisted in his helper toilsomely dragging the anvil out of his house to his smithy, which was only some twenty yards away. On my asking why he did not keep his anvil in the smithy, he said that he couldn't, because some one would be sure to steal it if he did!

I must, however, say that I never missed anything during the whole of my expedition, although many articles must have proved a sore temptation to the Malays; I have found them as a race trustworthy, and extremely loyal to their employers when fairly treated.

In the Jeringo district I was told that we were the first white men who had ever been there, and the inhabitants evinced the most intense curiosity in us and our belongings, and the same may be said of most of the other stopping-places on our route.

On our arrival next day at Tanjong Mas, we found that this miserable village was in a state of unusual excitement, owing to the presence of large numbers of Malay chiefs and their retinues who had come to wait upon the Chakun of Singgora, who was making a tour of inspection through the Siamese Malayan states, and had just then got as far as the capital of Lege.

Of Tanjong Mas itself there is very little to be said. It lies on the banks of the river Menara or Benara (?), which here splits into two branches, and, although fully a day's journey from the coast, is still navigable for river-boats carrying up to three tons burden. The village is situated in the midst of an extensive flat swampy plain, the cleared portions of which are entirely devoted to the cultivation of padi, this industry forming the sole occupation of the inhabitants. It is a miserable little village, in a state of extreme squalor and poverty. The previous rajah had been a cruel and rapacious ruler, but a man of considerable power and influence. He had only recently died, probably from the effects of poison, which appears to be not unfrequently resorted to by the Malays as the sole available means of tempering the despotic rule of their rajahs when the yoke of any one of them becomes too severe to be bearable, and at the time of our visit his successor had not been definitely appointed; the Chakun of Singgora was at that time in Tanjong Mas, occupied in settling this matter, and apparently having great difficulty in reducing the condition of anarchy and internal dissensions, under which the state of Lege was suffering, into anything like order. The Chakun is a man of considerable ability and force of character, intelligent, cultivated, and, strangely enough, a good mechanic. His brother, who acts under him as second viceroy, has travelled a good deal in Europe, has some knowledge of English, and is an able man. The administration of the Siamese Malayan provinces is on the whole very good and suitable to the people—more so, possibly, in some respects than our own in the British protected native states—and reflects great credit on the Siamese. Indeed, these provinces seem to me to be better administered than Siam proper.

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* The above-mentioned tempering is done as follows: The blacksmith covers the blade of the kriss with a thin coating of clay mixed with water to a creamy consistency, dries this coat over his fire, and then heats the blade red hot, the forge being a small charcoal fire blown by a wooden blowing-machine of the usual Chinese type. The red-hot blade was then thrust vertically into a piece of bamboo filled with strips of palm leaves soaked in water.

From Tanjong Mas we started on elephant-back for the headwaters of the Telubin. Our route lay about south-south-east, at first over the plains, following up the course of the river (here called the Tanjong Mas), until after some five hours we began gradually to ascend, being then 230 feet above sea-level. The entire journey lay through the densest jungle, so that no distant views could be obtained except at two or three spots where small clearings had been made, or where there were tiny villages consisting of a few Malay huts, in one of which we passed the night. The next day was practically a repetition of the former one, the route skirting apparently the base of a range of hills which are probably about 1500 feet high; our road, however, continued still at about the same elevation, namely, 200 to 300 feet above sea-level. After two days more of this work (elephant travelling being terribly slow, say 12 miles per day), we crossed the range at a pass known as Den Propo, the highest point of which was about 1150 feet above sea-level. Up to this point nothing had been visible of the geology of the country, except sands and clays, with but little gravel, even the beds of the streams being sandy, and showing nothing but fine granitic *débris*. Even on the hill itself no rock *in situ* was visible, except a deep red, very tenacious clay; there were, however, numerous boulders, which consisted principally of granite (some of it porphyritic), gneissoid schists, and highly metamorphic brown and grey slates.

The pass of Den Propo is on the flank of a hill known as Bukit Rusa, which forms a conspicuous landmark from several neighbouring clearings, and is probably quite 1800 feet high.

After crossing the Den Propo pass, our road lay partly along the banks, but more often in the bed of a small stream, the Sungei Mambong, an affluent of the Telubin, which we followed, and soon came to the river Telubin itself, here only a small stream.

We first struck the river at a small village known as the Chukai, a Malay word for a custom-house, this being one of the points where duties and taxes have to be paid to the Chinese headman, who is really a rajah ruling over the Hulu Telubin or state of Tomo, subject in some respects to the rajah of Lege, though in most matters only directly to the Chakun of Singgora.

In the neighbourhood of Chukai there have been very extensive alluvial washings for gold, and indeed a little gravel-washing is still being carried on by Chinese. From a point a few miles higher up, namely the small Chinese village of Hulu Sai, right up to and just beyond the village of Pacho, the river-banks have been worked almost continuously for alluvial gold, whilst at the villages of Pacho and Tomo gold quartz is being mined by the Chinese. The methods of conducting these operations have already been described by me in detail ("A Chinese Method of Gold-milling," *Trans.* Amer. Inst. Min. Engrs., 1891). The history of the origin of gold-mining in Tomo is quite legendary; according to one account given me by an old Malay, gold was first worked by an apparently superhuman tribe of Sakei with white blood who lived on gold. It seems that the Malays worked gold here for centuries, probably before the Chinese made their way into this country, and commenced systematic operations. The existence of gold in this spot is the *raison d'être* of its flourishing and powerful Chinese colony, the population of which must be at least 2000. They first entered the country about two centuries ago in small bands, and commenced to work gold through the sufferance apparently of the Malay rulers of this district. Every now and then the Malays, with the connivance, certainly, if nothing more, of their rajahs, would arrange raids upon the small scattered Chinese communities, and kill all they could come across, the rest taking to the jungle, whilst the Malays carried off all the gold they could find as a legitimate recompense for the trouble of the expedition—danger there was none, as the Chinese appear never to have attempted to show fight. With characteristic pertinacity the Chinese returned, however, to these rich deposits in ever-increasing numbers, until they became too important a factor in the population of the country to be killed off casually as before. Meanwhile one of the principal men amongst them had succeeded in getting himself appointed ruler over all this gold-bearing district by the King of Siam, paying heavy tribute for that privilege, and the Chinese colony gradually organized itself upon its own national lines, forming a most orderly and hardworking community. Some seventy years ago, the greater portions of the richer alluvials appear to have been almost worked out, and the Chinese then commenced to turn their attention to the reefs of gold quartz which occur plentifully throughout a small but well-marked district. Geologically speaking, it consists of highly metamorphosed schists and slates, which are occasionally seen overlying or penetrated by masses of apparently eruptive granite, this granite being quite distinct lithologically from that which carries tin nearer the mouth of the river. On account of the tremendous rainfall and the great heat, all rocks are decomposed to a very great depth, the product of the weathering being a tenacious white, brown, or yellow clay, which forms the usual bed-rock of the gravel deposits.

The village of Tomo, where the Chinese rajah resides, is a fairly flourishing place, with a population probably of three or four hundred; it lies on the bank of the river in a rather narrow valley, the elevation of the village being about 700 feet above sea-level, whilst the hills on either side rise to a height of about 1200 feet. On ascending the river beyond Tomo, the character of the country becomes wilder and more mountainous, the river breaking up into a number of mountain streams, veritable torrents in the wet season. Mountain chains are seen to succeed each other to the south, forming the great watershed, apparently, between the Telubin, Patani, and the other rivers that run northwards, and the great affluents of the Pahang river (?) that trend southwards.

The deposits of gold cease close above the village of Pacho, and the mountains beyond this point appear to consist almost entirely of granite.

It can only be said that nothing whatever is known of the geography of this mountain chain—not even the Malays themselves having ever traversed it, as far as I could learn. I have probably penetrated as far into it as any one, but could see no inducement to extend my researches in that direction. I spent a considerable time in exploring the valley of the upper Telubin, or the Tomo valley, as it may fairly be called, and extended my journeys to the Kelantan and Patani valleys, on the east and west respectively. By this time (the beginning of October) the rainy season had set in, and the upper river, which was not navigable for boats, had become a torrent. It was, however, absolutely necessary to descend it, and it therefore became necessary to construct bamboo rafts, and to commence our journey down river on these until we got to a point where we were able to obtain boats—a journey that proved to be attended with considerable hardships, and to be by no means free from actual danger, although accomplished without loss of life.

Although canoes can ascend the river as far as Chukai in the good season, yet a miserable village called Bene, in the neighbourhood of which there were formerly extensive alluvial gold diggings, is generally looked upon by the natives as the limit of navigation by boat of the Telubin. Bene is also the frontier station, on the river, of the Chinese rajah's domains, and has thus, in spite of its present state of squalid destitution, some local importance. Between Bene and Tremangan only small boats—carrying, say, two tons—are able to navigate, but from the latter point to the mouth of the river, large river-boats carrying over five tons are employed. These large boats are admirably constructed crafts.

The keel portion is formed of a flat-bottomed dugout, the sides being built up with hewn plank to the height of about 2 feet. The central portion is further built up into a kind of house about 4 feet high, and at times 15 feet long, the width of a large boat of this kind being about 6 feet. The bow and stern portions are decked over, the deck overhanging the sides of the boat considerably, so as to form a broad platform. It must be remembered that this entire structure is put together without the use of a particle of iron, being secured with wooden pegs and bamboo lashings, and made watertight by means of a curious resin known as "damar," which is found plentifully in the decayed trunks of certain species of trees. On the stern end of the platform stands the steersman, who uses a broad and heavy oar lashed to the boat as a rudder; on the bow platform are usually six men with long poles, who punt the boat up, three on either side. The punting is done by the boatman setting the butt of the pole (which is furnished with a small block of soft wood) in the hollow of his armpit, whilst he walks along his platform from the bow towards the stern of the boat, but, of course, only as far as the deck-house, which extends, as already said, right across the boat. Thus on each side two out of the three boatmen have always their poles in the water, pushing the boat, whilst the third man is going back to his place at the bow to take his turn, the men constantly following each other in rotation. It is extremely hard work, but the men keep at it for hours together, only stopping now and then for a chew of betel. When going downstream, poling is not necessary; the crew usually consisting of one or two men paddling, and one steering. The main difficulty then lies in shooting the rapids, with which this river abounds, there being some forty-five important rapids, besides numerous minor ones. When the boat comes to a rapid it is tied up and unloaded, all the cargo being carried by the men to some convenient spot at the foot of the falls. Two of the best men then take their places at the bow with poles, whilst the steersman sees carefully to the lashings of his steering-oar, and the rest of the crew grasp their paddles. With wild yells the boat is then pushed into the midst of the foaming torrent, which carries it over the rapids at a flying speed, the safety of the boat being due entirely to the thorough knowledge by the boatmen of the exact position of each hidden rock, and to the skill and activity which they display in handling their apparently unwieldy craft, which they do so dexterously that accidents are extremely rare. Nearly all the more important rapids have superstitions and legends connected with them, the Malays, and even the Chinese as well, being in the habit of offering some kind of trivial sacrifice at some conspicuous rock near the rapid, which is supposed to be the residence of the spirit who presides over the rapid in question, and who has to be propitiated to avert accidents. In going upstream the boats have to be hauled up the rapids by means of ropes made of rattan, of course after being unloaded. This type of river-boat is common to all parts of the Malay peninsula, but there are characteristic differences in detail of construction that distinguish the boats of the northern watershed from those of the Pahang side.

Besides the alluvial gold at Bene, there is an interesting occurrence of gold quartz, in a series of small reefs in slates and schists close to this spot, in a small stream known as the Katia. A party of Chinese worked this place, and excavated a large hole in following down the reef until they were drowned out by a sudden flood of the stream. It was at this spot that I came across the only example I have ever seen of the use of the fire syringe for domestic purposes by the Malays, as has been recorded by my friend, Mr. F. W. Rudler (*Science*, August 4, 1893, p. 65), in whose possession the instrument now is. There is gravel worked further down the Telubin for a few miles more, when it all ceases, at an elevation of about 300 feet above sea-level. The country becomes less hilly, and the geology changes somewhat abruptly. No more shales are to be seen, but only occasional bars of granite, whilst the river banks are more sandy, and in places consist of laterite; finally, about Tremangan the hills cease altogether, and the remainder of the course of the Telubin to its mouth is through flat sandy plains, which are in all probability due to the action of the river itself. It must be remembered that the banks of the river are everywhere clothed with dense impenetrable jungle, except in the few isolated spots where a little clearing and a few bananas and cocoanut palms indicate the existence of villages, which are all small and unimportant.

I made a journey from Bene to the headwaters of the Benara, or Tanjong Mas river. It is curious to note that the watershed between what are really two important rivers is formed by a very trifling flat ridge, not 100 feet in height at the place where I crossed it, and consisting largely of swampy ground.

The headwaters of the Tanjong Mas have, like those of the Telubin, been worked extensively for gold by the Chinese; but the Malays were so persistent in their murderous raids here, that at last they killed or drove off all the Chinese, and the extensive mines commenced by these latter have lain deserted ever since. These gold workings are remarkable for the fact that some of them consist of auriferous laterite, which is in places comparatively rich, but mostly only very poor. Still the occurrence is unusual enough to be worth recording.

A similar expedition from Tomo to the headwaters of the Kelantan river, to a point known as Blimbing, showed that the real watershed separating the Telubin and the Kelantan rivers is here also very low indeed, tributaries of these two important rivers rising within a few yards of each other from either side of a very low ridge. It is remarkable that in the entire length of the Telubin river there is not to be found a single indication of limestone, whereas the upper portions of the valleys of the rivers on the east and west respectively, the Kelantan and the Patani, show enormous cliffs of highly metamorphosed white and grey limestones. There is one, for instance, close to Blimbing quite 400 feet high, and I shall have occasion to mention far more important developments of this formation when speaking of the Patani. Here I need only say that these limestones appear to be quite unconformable to the underlying rocks, and that they seem to be the result of extreme metamorphism of coral reefs; this hypothesis, however, needs confirmation by a microscopic examination of the limestone itself.

The most important of the little villages on the lower Telubin is Kekabo, which derives such importance as it possesses from the fact that it is the river port on the east, of Khota Bharu, the capital of the powerful state of Reman, with which it is connected by the usual jungle road, at about three hours' distance. Reman is a state that has an extensive river frontage on both the Telubin and the Patani rivers, and, besides this, extends far into the mountainous portion of the interior. The rajah, an oldish man and a noted shot and sportsman, appears to possess great power. It would seem that he looks upon the inland position of his dominions as rendering him comparatively difficult of molestation by the Siamese, and their rule weighs very lightly upon him. He nevertheless pays triennial tribute to the extent of one gold and one silver tree, each weighing 25 taels (say 32 ozs.), and together estimated at $3000 in value. In addition to this, he pays some 50 or 60 taels (65 to 78 ozs.) of gold, elephants, cattle, etc., making the total amount of his tribute up to something like $12,000. To meet this, a poll tax varying from $1 to $3, according to the means and position of the individual, is imposed on each man, and smaller amounts on each woman and child. A rough census taken for the Chakun of Singgora some little time before my arrival, showed that the state of Reman contained some 5000 able-bodied men. The rajah is absolute ruler and owner of the whole state, and is apparently liked and respected by his subjects. Khota Bharu is the official capital of his state, but he passes much of his time at Goa Kapor, a small place on the Patani. Khota Bharu is a small village lying in an extensive flat plain, except on the south side, where it abuts on some low jungle-covered hills; for some miles round the town all the jungle has been cleared off the plains, and the ground is devoted to the cultivation of padi. The town really consists of a scattered group of small villages, each containing from three to a dozen houses, scattered amongst the padi fields within a radius of a mile or so round the royal palace, if a group of irregular, roughly built, but large bamboo huts surrounded by a high fence of bamboo deserve so pretentious a title.

Not very far from this capital, there are important tin-mines, whence cassiterite in a state of great purity in large pale-coloured crystals is obtained, occurring apparently in seams in decomposed granite. Khota

Bharu is about equidistant from the Telubin and the Patani rivers, the port on the latter being known as Biserat, which is, however, in the territory of the neighbouring state of Jala. Accordingly, almost the whole of the traffic from Khota Bharu is carried on *viâ* Kekabo. Here again it may be noted that there is no well-defined watershed separating these important rivers. Biserat, though neglected by the Reman people, is yet an important place for two reasons: firstly, there is a notable Siamese temple, or watt, about a couple of miles from it; and, secondly, it is the port for the capital of the state of Jala, known as Kampong Raja Jala. The Siamese have quite a settlement at the above-mentioned watt, there being a number of priests' houses grouped about a large cave in a precipitous limestone escarpment. The general features of the country here consist of a series of plateaux, surrounded and separated from each other by precipitous cliffs and perpendicular hills of limestone. The cave in question is in the sides of one of these, and the view from it, beautiful anywhere, is one of quite exceptional beauty for a jungle country, powerfully aided as it is by the gleam of a small sheet of water at the base of the hill; whilst the plateau itself is clothed in the tender green of the growing padi, with fringes here and there of cocoanut and areca palms, clumps of which surround each house or little village, whilst dotted amongst the fields there are great clusters of feathery bamboo. In marked contrast to these light shades is the frame of surrounding low hills, covered with their dark green tangle of heavy jungle, above which the dark crests of still higher ranges appear, whilst the gleaming white of the limestone escarpment shows out boldly here and there amongst the dark masses of jungle. After months of travel in a jungle country where extensive views are quite exceptional, one of such beauty cannot fail to leave an indelible impression on the memory.

The cave itself is not over 100 feet by 50 broad. Along one side of it is a reclining figure (? a Buddha, or a Siamese king, or high priest), built of bricks and plaster, some 50 feet long by 15 feet high, surrounded by a number of other seated figures, eighteen in all. It is to this cave that the surrounding rajahs have to come, or send their representatives, in order to drink the water of allegiance (an act equal to taking an oath of fealty) to the King of Siam every half-year, and this Siamese colony is thus not only an important outpost of Buddhism, but is evidently considered of importance from a political point of view. It need hardly be said that these Malays are strict Mahomedans.

From Biserat to the capital of Jala is only about a three hours' journey along a rough jungle track. The capital lies on the western edge of one of the before-described plateaux, surrounded by steep limestone cliffs. There is nothing distinctive about it or about the residence of the rajah, who is an old man of apparently very limited intelligence and not much authority. He seems to play a comparatively subordinate part, leaving most of the administration of the affairs of his state to his ministers; in so far, he may be said to be rather more of a constitutional ruler than is customary among the Malays. His state is very sparsely populated, the number of men being estimated as little more than one thousand. There may be said to be no interior to this state; the whole active life of which is confined to the river Patani. I followed a native track through the jungle for two days without coming to a single habitation. The river Patani, on the other hand, is fairly well populated. This river may be spoken of as well known, it having been ascended and descended very often by Europeans whilst the galena-mines near Goa Tumbus were being worked. I do not accordingly think it necessary to say much about it, more especially as in its whole course it presents nothing on either side but a series of low sand banks, covered with dense jungle, relieved by an occasional village, whilst higher up near its source it winds its way past numerous steep and picturesque limestone escarpments.

The geology of this river is utterly different to that of the Telubin. There are neither shales here nor granitic outcrops; only sand and limestone, the latter being, as already mentioned, conspicuously absent from the valley of the Telubin. Near its mouth the Patani splits into several branches, forming a comparatively large delta, most of which is devoted to the cultivation of padi. The capital of the small state of Patani—all that is now left to the rajah of what was formerly the most powerful state in this part of the Malay peninsula—lies on the main channel. It is a very thriving, busy town, there being here a flourishing colony of Chinese, some Siamese, and a few Arabs, who carry on a fair amount of trade with the interior by means of the river, and with Bangkok, Singgora, Tringganu, and Singapore by sea, the chief articles of export being salt, rice, tin, fish, pigs, and fowls. The town contains probably 2000 inhabitants; those of the whole state being said to number 5000.

Going up river and passing Biserat, the next place of importance is Benang Sta, which forms the port of the tin and galena mines. The galena, which, as before said, was worked by an English company, occurs in small pockets either in the limestone or more often at the junction of the limestone and granite. It was not rich enough in silver to be worked profitably, the company failed, and the mines are now utterly deserted. In the immediate neighbourhood of the galena deposits there is, however, a large colony of Chinamen, who work alluvial tin. There is one deposit here, quite unique, as far as I know, in the world. It has been produced by the gradual degradation of cassiterite-bearing granite and of limestone containing pockets of galena, the result being a gravel cemented by oxide of iron, the product of the decomposition of large deposits of iron and arsenical pyrites. The Chinese sluice away the worthless earth that overlies this gravel, and break the latter out with heavy crowbars. They then stamp it under tilt hammers worked by the foot, made entirely of wood, with a stone head and a stone for a mortar. The crushed gravel is washed, and, as the result, there is left a mixture of tin stone with oxidized lead ores, principally anglesite, cerusite, pyromorphite, and mimetite, all decomposition products of the original galena deposit. The Chinese smelt this residue with charcoal in small blast furnaces about 7 feet high, producing, besides a good deal of lead fume, a natural alloy of lead and tin. In fact, this curious mine may be correctly described as a "pewter mine." The alloy of lead and tin so produced is sold by the Chinese to the rajahs of the surrounding states, who use it to make the small coins, the "pitis," already referred to. I analyzed one of these pitis, and found it to contain—

Lead	69·4
Tin	27·9
Iron	0·7
Sulphur, arsenic, and other impurities	2·0
	100·0

and this may be taken as the typical composition of the natural pewter here smelted out.

Another curiosity from the mining point of view is a small underground stream which runs beneath a huge cliff of limestone for about half a mile, practically the whole length of which has been worked for alluvial tin. In addition to these lead-tin mines, there are numerous others among the hills where alluvial tinstone of a very high degree of purity is obtained and smelted by the Chinese in small furnaces. All this tin is sent down the Patani river to the town of Patani, whence the bulk of it is exported to Singapore, so that this tin district, which provides profitable employment for several hundred Chinese, is the main source of the wealth of three states, Reman, Jala, and Patani. The output is probably from 200 to 400 slabs of tin of 60 kati each per month; say altogether 140 to 280 cwt., including both the lead and the pure tin, the former being worth only about half as much as the latter.

After a thorough exploration of the Goa Tumbus district, which extended to the head waters of the river Tiba on the frontier of Keda, the results of which are recorded on the accompanying map, I returned down the Patani to Biserat. It may be truly said that all these Malay States present so many points of similarity, whilst salient points of interest are so few and far between, that a detailed account of my many months of jungle travel through them would only be wearisome to the reader, and could serve no useful purpose that cannot be better performed by the map of my route.

At Biserat I left the Patani, and, crossing Reman again to Kekabo, I continued my journey down the Telubin to Selindong Bayu at its mouth, this portion of the journey presenting no feature of any special interest. Arrived at Selindong Bayu, we found that the north-east monsoon was blowing. There being, however, no alternative, as my funds and provisions were exhausted, I chartered a small but stoutly built Chinese boat with a crew of four Chinese, and induced them to put to sea, and after five days with some difficulty made the mouth of the river Tringganu, where we fortunately found a small trading steamer bound for Singapore, which took my party and myself back in safety, arriving there on March 17, 1891, after an expedition that had lasted exactly seven months.

I may add a few words as to the method employed in mapping my route, as it may prove useful to explorers under similar circumstances. I made a careful time and compass survey of the rivers as I went down them, taking bearings on to all prominent points that could be seen from the boat. Whenever possible, I took the sun at midday by means of a good sextant and an artificial horizon; I thus obtained my latitude, at any rate, every other day. It will be noticed that the general course of the rivers is northwards. I accordingly resolved all the traverses obtained by the time and compass survey, adopting some convenient arbitrary rate of travel. I thus obtained a supposed difference of latitude for each day's work, which, corrected by the observed differences as obtained by my meridian observations, gave me the elements for correcting the co-ordinates of each traverse by multiplying or dividing by the constant thus found for each day's work. The method is not a difficult one, is fairly rapid, and extremely accurate if carefully worked.

A SURVEY OF THE ENGLISH LAKES.

By HUGH ROBERT MILL, D.Sc.

THE following brief abstract contains an outline of the report on the survey of the larger English lakes, which was presented at the meeting of the Royal Geographical Society on June 18, 1894. The full discussion will be published by the Society in a separate form, with maps on the scale of 2 inches to 1 mile (1 : 31,680) and numerous other illustrations. Notes of the progress of the work have appeared from time to time in the *Journal* (see vol. ii. pp. 165, 362, and 548; and vol. iii. p. 421).

The Lake District of North-western England is a remarkably definite and symmetrical geographical unit. It may be roughly described as a circular mass of elevated land, highest in the centre, and furrowed by a series of valleys running from the centre toward the circumference like the spokes of a wheel. Most of these valleys contain long narrow lakes of considerable size, and of a different type from the small round mountain tarns which also occur in the district. A circle of 15 miles' radius drawn from the centre includes all the lakes and all but one of the tarns.

Numerous soundings have been made in most of the lakes by members of the geological survey and others; but until the author of the paper, with Mr. Heawood and other assistants, undertook the systematic survey of the depths last year, at the expense of the Royal Geographical Society, there had been no attempt to construct definite maps of the basins, comparable in accuracy with the Ordnance Survey's contouring of the exposed surface of the land. In all other countries, limnology, the science of lakes, has been pursued with much diligence, and in several, particularly in France and in Switzerland, the work has been carried out by Government.

A lake must be looked on as the product of a long process of evolution which still continues. The formation of the primitive hollows is so remote in time, that modifications by deposit of sediment and wearing away of the banks have now almost, if not entirely, obliterated the evidence of the agents which produced them. Thus the lake district contains scenery of different chronological orders.

The methods employed for ascertaining the depth and fixing the position of each sounding, and for mapping the resulting information are fully detailed in the complete paper. A special feature was that the work of each day was plotted on the 6-inch map the same evening, so that any uncertainties might be detected and investigated before leaving the neighbourhood of the lake. The lakes considered were Windermere, Ullswater, Coniston, Wastwater, Ennerdale Water, Buttermere and Crummock Water, Derwentwater and Bassenthwaite Lake, and Haweswater, each of which was found to have certain special characteristics which distinguished it from all the others.

The more important statistics regarding them are condensed in the accompanying table:—

TABLE OF STATISTICS OF ENGLISH LAKES.

Name.	Length, miles.	Breadth, yards.		Elevation of surface above sea, feet.	Depth, feet.			Area, square miles.	Volume, million cubic feet.
		Max.	Mean.		Max.	Mean.	Mean per cent. of max.		
Windermere....	10·50	1610	950	130*	219	78½	36	5·69	12,250
Ullswater.......	7·35	1100	827	476	205	83	40	3·44	7870
Wastwater	3·00	880	650	200*	258	134½	52	1·12	4128
Coniston Water.	5·41	870	600	143*	184	79	43	1·89	4000
Crummock Water	2·50	1000	700	321	144	87½	61	0·97	2343
Ennerdale Water	2·40	1000	800	369	148	62	42	1·12	1978
Bassenthwaite Water......	3·83	1300	950	223*	70	18	26	2·06	1023
Derwentwater ..	2·87	2130	1270	235*	72	18	25	2·06	1010
Haweswater....	2·33	600	405	694	103	39½	38	0·54	589
Buttermere	1·26	670	620	331	94	54½	58	0·36	537

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* Depths determined at time of sounding, other depths ± 2 feet.

There are two main types amongst these lakes, the shallow and the deep. The former includes only Derwentwater and Bassenthwaite, the broadest of all the lakes; they only average 18 feet in depth, and their average depth is only 25 per cent. of their maximum depth, a smaller ratio than for any other lakes. The bed of these lakes may be roughly described as an undulating plain, grooved and ridged into shallow hollows, and low shoals running parallel to the long axis of the lake. The fact that these lakes are separated by a strip of alluvial ground so low that their waters mingle in heavy floods, shows that they may in some ways be viewed as a single lake, and the configuration suggests that they may have been shallowed by glacial accumulations.

The second, or deep type, the shallowest of which has an average depth of 40 feet, and in which the average depth varies from 36 to 61 per cent. of the maximum depth, showing a steep-sided character, comprises all the other lakes. Ennerdale, however, combines the characteristics of the two, conforming to the deep type in its upper, to the shallow in its lower reach. The deep lakes are long, narrow, sometimes winding like Ullswater, or slightly curved in outline like Wastwater and Haweswater. The most characteristic lie in long narrow valleys with steeply sloping sides, and the slopes are continued under water with almost equal steepness, in some cases with greater steepness, and terminate in a nearly flat floor. The typical form of this class of lake is thus a steep-sided flat-bottomed trough, diversified along the slopes by the still steeper conical mounds of *débris* thrown down at the mouths of streams.

In Haweswater the largest example of a delta occurs, nearly cutting the lake in two; while Buttermere and Crummock, lying in one uniform valley, are entirely separated, probably by the same action, and the separation of Bassenthwaite from Derwentwater is probably of similar origin.

Although most of the lakes show only one clearly defined trough, the two largest are divided into distinct basins. In Windermere, the shoal on which Belleisle and the other islands off Bowness rise, separates the deep and wide upper basin from the less deep and much narrower lower basin. In Ullswater each of the three reaches of the lake contains a definite basin separated from the others by broad or narrow bars. From one of these the island of Householm rises, a mass of strongly glaciated rock; but while the position of the basin to the south of it seems to confirm the glacial theory of the excavation of the hollow, the basin to the north of the island is so situated as to make its origin by glaciation somewhat difficult to account for.

Three of the lakes have depths which descend below sea-level. In Wastwater 217 acres lie beneath sea-level, so that if drained to that extent it would present the appearance of a lake still 58 feet in depth at one point. Windermere, if similarly drained, would show a northern lake 3½ miles long with a maximum depth of 90 feet, and 3 miles further south a narrower lake 1 mile in length and only 14 feet deep at its deepest, while south of this there would be a still shallower lagoon half a mile long. In Coniston reduced to sea-level there would probably appear one narrow lake 2¼ miles long and 42 feet in maximum depth. All the other lakes are situated at such elevations that they do not approach sea-level in their greatest depths.

Summarizing the special features of each lake, Windermere is the longest and has the greatest volume of water; Derwentwater is the widest and the shallowest; Bassenthwaite has the largest drainage area; Wastwater is the deepest both in maximum and average; Coniston is the narrowest of the larger lakes; Crummock the steepest-sided and the flattest-floored; Ullswater the most complex in outline and in structure; Ennerdale unites the deep and shallow types of structure; and Haweswater is unique in the size of its lateral delta.

Altogether, the lakes which have been sounded and mapped cover an area of 20 square miles of unexplored territory. Contoured maps of the ten lake-basins under consideration have been supplied to the Ordnance Survey for incorporation on the official maps of the country.

The paper when read was illustrated by a series of special photographs of the Lake District, and numerous maps and diagrams projected by the lantern. A series of historical maps of the Lake District, lent by Mr. J. E. Marr, F.R.S., was exhibited in the ante-room.

Before the reading of the paper, the PRESIDENT said: We are met this evening to hear the address of Dr. Mill with reference to his report on the survey of the English lakes, which was undertaken under the auspices of this Society. I am one of those who have had the privilege of hearing Dr. Mill before, and I think I can promise the meeting a most interesting and agreeable evening.

After the reading of the paper, the following discussion took place:—

Professor BONNEY: As I have not the honour of being a fellow of the R.G.S., perhaps I may venture to commence by expressing my sense both of the extreme value of these investigations of Dr. Mill, also of the singular facility of diction and clearness of narration, with which they have been put before the meeting. I think, also, the Geographical Society itself is to be congratulated upon the accomplishment of such an extremely valuable piece of work. We now know something of the contours of the lake-beds in the Cumberland, Westmoreland, and Lancashire districts. We cannot but feel a certain regret that it should be left for a society composed of private individuals to undertake such a business. It does seem to me that this kind of investigation is one that ought to have been discharged by the ordnance survey; it has not been for want of application, it has not been for want of urgency, but apparently they have not had the power given them by Government to undertake any research, the result of which is not visible to the eye. I confess that that is only one other indication of how little the ruling powers in this country care for science; it is fashionable at the present day to praise it, but we may say, perhaps, of science as the old Latin said of virtue, "Probitas laudatur et alget," "Honesty is praised, but left to starve." However, we will not go into these political or semi-political questions. I feel some little difficulty in commenting upon this paper of Dr. Mill's, because I am somewhat in the position occupied, I know not how many years ago, by the oriental prophet, who, when he was sent for to curse, stayed to bless. I do not know how it was, but I had the impression that Dr. Mill had come to conclusions which were antagonistic to those I formed myself a good many years ago, but I find that, instead of having to stand up for my own views, his researches, although he carefully avoided entering upon the controversial aspect of them, are not antagonistic. Accordingly I feel somewhat in the position of a person who has not got very much to say, but I would venture to call your attention to one or two very interesting points in his remarks. We find that in the same district you have the broad and shallow type of lake, and the narrow and deep type, as it were side by side. Now, this occurs where the rocks are not on the whole very different, and yet we are told, in certain arguments brought forward for the glacial origin of lake-basins, that you have the lake broad and shallow in one type of rock, and narrow and deep in another. Again, when you go into the adjoining room and examine these maps where you have the work of M. Delebecque in the French lakes, and the work of Professor Forel in some of the adjacent Swiss lakes, you will see the same types of structure in the forms of their beds that you have seen on the screen to-night; it is a remarkable fact that in so many cases you have these flat plains in the beds of lakes, on the existence of which Dr. Mill insisted more than once this evening. Now, such a type of lake would be appropriate if the lake has been excavated by glacial action. Nevertheless, we find the contours from above the surface of the lake are carried down underneath the surface, as you have seen more than once in the photographs, also in some of the maps in the next room. Lake Bourget and the Lake of Geneva in Switzerland, the Lake Annecy in France, have these basins, yet we find ourselves, supposing we assume a theory of glacial excavation, pulled up again and again by the existence of anomalies in structure hard to explain upon that theory. There is, in addition, a further and wider difficulty. Whenever we know the shape of the valleys above the lake-basins, we find they indicate that glaciers have not any great excavatory power. It would take far too long to discuss this subject, so I will merely say it appears to me there is a peculiar value in these particular investigations. I have never denied that under certain circumstances a glacier may excavate; of this we have probably some trace in corrie-tarns. These circumstances are when the level of the glacier changes suddenly, or when it has to struggle over some intervening obstacle, as in a narrowing valley; but we see in most cases that in a valley occupied by glaciers you have to draw a distinction between this and water erosion. Now, it appeared to me, after the investigations of my friend Clifton Ward, that these lakes in Cumberland and Westmoreland, and some of the smaller lakes in Scotland, were upon the borderland—possibly produced by the excavation of ice, possibly also by other causes, probably differential movements of the Earth's crust. I think that these careful and precise investigations, giving us facts upon which we can argue, will enable us to fix more precisely the limits between the small basins probably due to the excavatory action of ice, and those other and generally large basins produced by differential action of the Earth's crust, and the consequent flooding of beds of valleys already worked out by the ordinary processes of river and subaerial denudation.

Mr. J. E. **Marr**: I rise with a considerable degree of diffidence, because, in the first place, I have not the honour to belong to this Society, and also I find that I am about to follow my old college tutor. With regard to the admirable paper we have heard to-night, I may remark, in the first place, that Dr. Mill was good enough to send me for examination the soundings he obtained. These I submitted to two experts, Mr. Hutchings, and Mr. Woods of Cambridge, who examined them for minerals and organisms. One point comes out concerning the examination made by Mr. Hutchings which, I think, will interest the Geographical Society and Dr. Bonney. He found the soundings of Bassenthwaite entirely different to those of the other lakes, as would be expected. But Coniston is situated in rocks similar to Bassenthwaite, yet the soundings of these lakes are like those of others; so he concluded that the Coniston streams must drain chiefly through volcanic rocks. Is it possible that we can prophesy concerning the hydrography of regions by a microscopic examination of their sediments? I have had the pleasure of seeing Dr. Mill's maps before this meeting, and there were certainly one or two points that struck me as particularly interesting on account of their bearing upon the origin of the lake-basins. I will touch upon one or two points. As regards Ennerdale, the deepest part of this lake lies in the granite rocks, the shallowest part in the soft sedimentary rocks; it seems remarkable that ice should have excavated more extensively the harder rocks than the soft sedimentary rocks. Then there is Loweswater, exceptional in all our lakes because it drains towards, and not away from, the centre of that district, which necessitates that the ice should be working uphill—by no means impossible, but in this case difficult to imagine. Then I saw in the map of Windermere one feature which will probably be brought out very often on further study of Dr. Mill's maps, a feature remarkably like a submerged river-valley. The contours above the lake here are closely parallel with those below the lake. On any glacial erosion theory, this depression (which is in Pullwyke Bay) would be produced by ice coming from the west. Now, those who know the district know there is no opportunity for the formation of such a glacier. As a matter of fact, the ice went absolutely at right angles; so it seems the submerged valley is one formed previously to the formation of the lake, which is dead opposed to any theory of glacial action for the formation of these lakes. Valuable as Mr. Ward's work was, he could not, in the time at his disposal, carry out the survey in the admirable way in which it has been carried out by Dr. Mill. I am expressing the opinion of all geologists when I say we shall heartily welcome this work, which is the starting-point for fresh controversy on this subject. We shall have the origin of lake-basins again discussed at an adjoining society, and it will be decided by the data supplied by the author of to-night's paper.

Captain Wharton: I suppose the President has called upon me to make some remarks because I have had a great deal to do with sounding, otherwise I must say I do not see the connection between my work and the sounding of lakes. I am very glad of this opportunity of expressing my recognition of the great value of Dr. Mill's work, and congratulating him that there should have fallen to him to do what has been so very long neglected in this country. The fact is that the lakes have fallen between two stools—the ordnance surveyors have been prevented from doing it, and the hydrographic department has been unable to see that the lakes and tarns come distinctly under the head of navigable waters. It is true that one of my predecessors strayed from the paths of virtue and sent some sailors to sound Loch Lomond, but since that time we have been obliged to confine ourselves to our own waters, the sea. One point of Dr. Mill's interested me—the slopes of the lakes, especially those where there are screes, and it shows that the shallow slopes we get off cliffy shores are due to the action of the waves, as you do not get them in lakes. I do not see myself that it has anything to do with the formation of the lake, because, as I take it, those contours are not those of the original rock, but of the tumbled fragments broken up by subaerial denudation. I was interested also in the description of Dr. Mill's sounding operations, and am very glad to see that he has by his own force of intelligence arrived at the same conclusion we arrived at some time ago—that you must plot your work on the ground and examine it before you go away, or you may leave out a most important part. I am sorry to say the earlier surveyors very often, in the press of work, took their soundings and did not actually make their charts as they went, and consequently many suspicious places were left unexamined. I do not know that I can do more than again heartily congratulate Dr. Mill.

Mr. E. Heawood: There is little for me to add to Dr. Mill's admirable description of the English lakes. One point, however, on which I should like to touch very briefly is the position of the deepest basins relatively to the general form of the valleys in which the lakes occur. In the case of lakes dammed back, whether by landslips or glacial deposits, we should expect to find a gradual deepening from above downwards in accord with the slope of the valley. Now, in their present condition, at any rate, this is not the case at all with the English lakes. Considering Derwentwater and Bassenthwaite as properly forming a single basin, and the same with Buttermere and Crummock, I find that in four of the principal lakes the greatest depression occurs in the upper half, in three it is central or but slightly below the centre, and in one case only, that of Buttermere and Crummock, does it occur decidedly towards the lower end, but even here an important depression is found quite at the upper end. If we search for some definite rule which governs the position of the deep basins, there seems ground for the assertion that they occur in association with the highest parts of the shores, or, as I should rather put it, with the points where the high ground slopes most steeply to the water. To give only one or two instances: abreast of the deepest part of Derwentwater the 1000-foot contours on the two shores are only 1⅔ mile apart; they afterwards widen out to over 3 miles, but again close in to the former distance just where the deepest part of Bassenthwaite occurs. In Buttermere and Crummock, the deepest parts respectively are just between Robinson and High Crag, and between Grasmoor and Mellbreak; and in Wastwater between the highest point of the Screes and Middle Fell, where the 1000-feet contours are only 1¼ mile apart, while at the lower, shallower end they have widened to nearly 2 miles. The reason would seem to be, not that the materials from beneath the depressions have gone to make the mountains, but that opposite the steep slopes the lakes have not been filled up by the wear and tear of the mountain sides to anything like the same extent that they have elsewhere. The fact that the shores recede, of course means that the lake receives the drainage of a larger area of country, the products of the denudation of which eventually find their way to it, and, in accord with the above-mentioned position of the deep basins, we find that hardly any important streams empty themselves into them. As to the question how far the shallowing can be due to sedimentation, although, from the very steep angles at which the deltaic material slopes into the water, it might appear that the effect cannot reach far from the shore, we must consider that this material is simply shingle which is pushed out into the water, and that the fine matter held in suspension behaves very differently. It seems natural to suppose that even when once deposited it is not finally at rest, but that, under the combined influence of currents and gravitation, a gradual movement out into the deepest parts would take place. Gravity then ceasing to act, there would be no tendency to further shifting. If the above explanation is correct, the shallowing at the lower ends of the lakes would be a natural corollary of their radiate arrangement, which, to some extent, involves a progressive widening of the drainage areas from the centre outwards. The idea also that the original form of the valleys is best preserved in the deep basins, is borne out by the fact that it is just here that the correspondence of the slopes above and below the water is most marked.

The fact that the lakes as a whole reach just as far and no further than the beginning of the more level country which skirts the district, is in one way merely an extension of the principle of the shallowing at their lower ends. The same fact also shows that they are not held back by anything like a dam thrown across a narrow valley, for in some cases we should have to traverse the level country for miles before reaching a point as low as the deepest parts of the lakes, in several cases considerably below sea-level.

Mr. **Douglas Freshfield**: In this Society we are generous in our obituary, or, as I may surely say, quasi-obituary notices of departed officers. I feel, after the reference made to myself in the President's annual address, that there may appear to be something unseemly, almost improper, in my posthumous appearance here to-night. But since Mr. Markham was good enough to express a hope that I should continue to take "a warm interest" in your affairs, and still more since, if I come before you as a "hollow ghost," it is in order to praise a "living man," I hope you will forgive my intrusion on this discussion. The rare occasion of a paper being read before the Society by one of our permanent staff appears to me a fitting opportunity for paying a debt due to that body from your honorary officials. And there are few—there is, I believe, no one—who can speak with more experience than I can of the services our heads of departments have rendered in the last fifteen years, and are rendering to the Society. It would be invidious to draw distinctions where all are alike in devoting not only their office hours, but also much of their leisure, to promoting the interests of the Society, and spreading the science it ought to represent throughout the country. The excellent paper laid before us to-night is only one among the many fruits of this fortunate zeal in our officials.

The subject of Dr. Mill's researches has long attracted the attention of serious students of mountain structure. Since the days of De Saussure physical inquirers have asked to know the conformation of the concavities as well as of the convexities of the Earth's surface. The founder of modern geology, in the map which forms part of his work, gave the depths of the Lake of Geneva as well as the heights of the crests that encircle it. The greatest depth he measured was roughly 1000 feet, and it is, I doubt not, on this measurement that Byron founded his circumstantial statement—

"A thousand feet in depth below
Its massy waters meet and flow,
Thus much the fathom-line was sent,
From Chillon's snow-white battlement."

This passage probably misled the unwary until in 1837 our old friend, the late Mr. John Murray, in the first edition of his 'Swiss Handbook,' which he wrote in great part himself, cut down his own poet's round figures to a bare 280 feet. This measurement of the depth below the walls of Chillon has lately been confirmed by the Federal Survey. Those who are acquainted with foreign cartography know that in Switzerland the Government maps—to speak precisely, the Siegfried Karte—show the lake-depths by contour-lines laid down with the detail and nicety which distinguish the work of that most intelligent, efficient, and enterprising department. The Swiss Survey Department is a model to all nations of what such a bureau should be, producing the best possible work, placing that work before the public in the most convenient forms, and ever ready to assist scientific or general publications by the loan of any material in its possession. It has thus created a national standard of cartography which is generally recognized by competent critics as above that of any country in the world. In France the mapping of lake-basins has been undertaken by the Department of Public Works, but elsewhere on the continent—in Bavaria, for example—it has, I believe, been left to private enterprise. In our own country science has for some time endeavoured to interest the two Government departments who might, by unofficial and inexperienced minds, be supposed to be concerned in the matter. The Survey Office was sympathetic, apologetic, but in the main evasive. It quite agreed that lake-depths form part of a complete survey, but it represented that no special instructions had been given, or funds allocated to it for this purpose, that it had no boats or persons trained to use them, and that it would be well, perhaps, to apply to the Admiralty. The representative of that department, however, roundly repudiated any concern with waters not navigable. He was most decidedly "of opinion that the matter had nothing whatever to do with the Admiralty." If it had surveyed Loch Lomond—that was "long ago"![*] The result of our inquiries was that the officers of the Society recognized that if we wanted the thing done in our lifetimes, we must at any rate make a beginning ourselves. In Dr. Mill we felt we had the right man at hand. He had already earned a medal from his countrymen at Edinburgh for his researches in Salinity, for his feats on salt-water fjords. He has again shown his competence in the valuable collection of fresh-water facts he has laid before us to-night. My own views on lake-basins have been set out somewhat fully in our *Proceedings*, vol. x. N.S. I shall not attempt to-night to draw inferences from Dr. Mill's facts in favour of any theory. I would rather endorse his cautions, that we should not attempt to theorize until we have both a full collection of facts and time to consider them, and that we should give due weight to the alterations in the primitive forms of lake-basins caused by the incursion of alluvium and earthfalls. There are many inland waters still to be sounded in British territory. With regard to those in our great colonies and dependency, a step has been taken by a body to which Professor Bonney and I both have the honour to belong, the Committee of the Alpine Club. It has sent a memorandum with regard to possible observations bearing on glacial action, including lake-basins, to the Governments concerned, and from these, Canada, New Zealand, India, it has received very encouraging replies. More than this, the Governments have taken the very practical step of distributing our memorandum among their surveyors. With regard to the inland waters still unsounded and uncontoured in Great Britain, I have also some hope. I commend the matter to the special attention of the President of the Geographical Section of the British Association, which meets at Oxford this summer, and I trust he may be able to bring his weighty personal influence to bear on his other self, the Hydrographer to the Admiralty, so as to induce that official to return to the paths of his predecessor who surveyed Loch Awe and Loch Lomond, and to yield to science her modest demand—that of Three Men in a Boat.

The PRESIDENT: I am afraid at this late hour we must close this interesting discussion. The meeting will agree with me that we have seldom listened to a more admirably spoken address than we have heard this evening from Dr. Mill. It occurred to me that the most characteristic point in it was its suggestiveness. For we were told that there is still an unknown part of England which has been recently surveyed by Dr. Mill for this Society, and which, I believe, covers about 20 square miles of ground. We have also had pointed out to us almost a new branch of our science, namely, limnology, which this Society and the Council of this

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[*] See Report of Departmental Committee on Ordnance Survey, 1893, answers 589-95, and 5012-18.

Society should take every opportunity of fostering. Hitherto we have looked only to the discovery of the surfaces of great lakes. I can quite well remember, when I first became officially connected with this Society, we were full of the discovery of Lake Nyasa, and now I hear, somewhat to my astonishment, that the Admiral at the Cape Station has actually proceeded to this lake, unknown 30 years ago, and hoisted his flag on one of Her Majesty's ships on that lake in order to inspect that portion of his squadron, and I venture to think when this has been done on the surface of the lake it will be considered within the duties of the hydrographer to explore its depths. But we all know that the hydrographer does all he can to further the interests of the department over which he presides, and will only be too glad to extend his usefulness. It now becomes our pleasant duty to return our thanks, not only to the deliverer of this interesting address, but also to others who have assisted him. I consider that the Society and this meeting owe their very grateful thanks to Mrs. Mill for the important part she has taken in this survey and also to Mr. Heawood, and including those two assistants in our vote, I request Dr. Mill to accept our cordial expression of thanks for his most interesting and valuable address.

DR. BAUMANN'S JOURNEY THROUGH EAST AFRICA.*

By E. HEAWOOD.

THE handsome volume which has appeared as the result of Dr. Baumann's journey in East Africa, 1891–1893, deserves a foremost place among recent African literature on many grounds. Although in no part passing beyond the limits of German East Africa, the route was so chosen as to traverse a surprising extent of new country in proportion to the total length, such as falls to the lot of few expeditions at the present day; and these unexplored tracts, for the very reasons which have caused them to remain so, are of special interest from various points of view. The scientific training, which Dr. Baumann had already put to good use both in East and West Africa, has enabled him to make the best use of his opportunities for observation, and the result is a work of solid value, not the least merit of which is the comparatively small space taken up with the incidents of the journey, and the amount of attention which can therefore be given to a general survey of the country passed through, in its geographical, ethnological, and economic aspects. The abundant illustrations are well chosen for the elucidation of the characteristic features of the country and its inhabitants, an unusually large number being devoted to the latter.

The general direction of Dr. Baumann's route is well known. Starting from Tanga, the rising port of entry into the northern part of the German Protectorate, and passing to the south of Kilimanjaro, he struck eastwards into the unvisited tract between that mountain and the Victoria Nyanza, discovering two new lakes, of one of which no report had previously reached Europe. After visiting the south-east shores of the Victoria Nyanza, where he traced the outlines of the gulf bearing his name, he made a tour through the Shashi countries lying east of the lake; and then, to add to his knowledge of the plateau region which he had left, returned by a more southerly route almost to Lake Eyassi. The last section of his outward journey led him to the hitherto untraversed country of Urundi, between the Victoria Nyanza and Tanganyika, containing the source of the Kagera, the principal feeder of the former lake. On the return journey, having reached Tabora by a new route through Uha, he still avoided the beaten track, striking northwards to complete the examination of the East African trough to the south of Lake Manyara. During this extensive journey he was several times compelled to fight to obtain a passage, the opposition of the exclusive Wambugwe near Lake Manyara having this beneficial result, that the cattle taken by way of reprisals afforded the much-needed food-supply for a great part of the journey.

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* 'Durch Massailand zur Nilquelle.' By Dr. Oscar Baumann. Berlin, Dietrich Reimer, 1894.

Perhaps the most important section of the route was that through the area of island drainage lying between Kilimanjaro and the Victoria Nyanza. This is a region of elevated steppes and plateaux lying west of the East African schistose ranges, and traversed from north to south by the great East African trough, as well as by two side branches of it—that from which Kilimanjaro rises in the east, and that of the Wembere steppe and Lake Eyassi in the west, which forms a *cul-de-sac* in the plateau. The Masai steppe, almost uninhabited and waterless in the dry season, falls gradually to the central trough in which Lake Manyara is placed. This is a shallow salt lake, with thick deposits of salt on its shores, varying in size according to season, but never quite dry. South of the lake the depression continues more or less marked towards Ugogo. The western wall is by far the steeper, and forms the escarpment of the elevated Masai plateau. While the floor of the trough is of a steppe-like character, the greater precipitation on the plateau supports rich pastures and patches of forest. The air is always cool, and there is less variation between the seasons. The Wembere steppe resembles a salt desert, and the bounding heights are not as a rule inviting. Lake Eyassi shrinks even more than Manyara in the dry season, and its shores are more sandy and devoid of vegetation. The granite plateau of Unyamwesi to the west is marked by great uniformity of surface, mountains being replaced by piles of granite blocks, which are well shown in several of the illustrations. The streams are little more than rain-channels with broad sandy beds, and the dryness seems to be yearly increasing. Still there is water enough for cultivation, tracts of which alternate with uninhabited stretches of steppe-forest.

With regard to the Victoria Nyanza, Baumann, like other travellers, noticed the apparent ebb and flow of the lake, without being able to decide whether it were due to winds alone. After falling for some years, the level is again rising. As regards the feeders of the lake, the author states fully his grounds for claiming to be the discoverer of the "Caput Nili," in the source of the Kagera. There can be no doubt—it was recognized both by Speke and Stanley—that this river is by far the most important feeder of the lake. Its volume is only a third less than that of the outlet, and the water of other streams, with that which falls as rain on the surface, is therefore not much more than enough to counterbalance the evaporation. The contention that the lake itself is the source of the Nile therefore loses its force. But, without wishing to detract from the honour due to the discoverer of the *most remote source* (*i.e.* measured along the stream), we cannot help thinking that the singling out of one among the countless rivulets which supply an equal amount of water, as *the* source of any river, meets the requirements rather of sentiment than science, and, in fact, it is chiefly in the case of rivers whose general origin has been involved in mystery that such an importance has been attached to the definition of the ultimate source. In connection with this subject, it is certainly remarkable that at the source of the Kagera Dr. Baumann should have come across the Missozi ya Mwezi, or "mountains of the moon," * and should have found the country of the Warundi, to be known to the neighbouring tribes as the "land of the moon," from a past ruling race, derived thence by tradition. While careful not to lay too much stress on this coincidence, Baumann thinks that an earlier greater extent of this kingdom may have led to the appellation being connected with the Nile sources. At all events, more is to be said for this theory than for that which connects them with Unyamwezi, which name was originated by the coast traders.

The country between the Victoria Nyanza and Tanganyika is traversed by the Central African schistose ranges which bound the Central African trough to the east. Characteristic of this region is the perennial nature of the streams, the amount of water derived from the hills being very great. The southern versant of the Nile-Congo watershed is, however, dryer than the northern. Lake Akanyaru, which had figured on our maps since Speke's time, has now to be dismissed, though the existence of a lake at the source of the Rusizi, also first mentioned by him, seems to have received confirmation.

The chapters dealing with the ethnology of the regions traversed are of special interest, the author not merely giving a full account of the customs, implements, etc., of each tribe, but dealing in a comprehensive way with their connection with one another, their origin, and so forth. The region is of particular interest as forming the borderland between the Bantu and Hamitic races, while the physical nature of much of the surface—the wide uninhabited stretches of steppe and plateau, roamed over by nomadic tribes—has kept many of the tribes untouched by contact with the outside world, many of their names being now heard of for the first time. In the area of inland drainage their variety is extraordinary. Hamitic in physical type, though of a "Nilotic" speech, are the Masai and their near allies, the Wataturu. The former seem destined to extinction from their want of intelligence, and of power to adapt themselves to life as agriculturalists. The tribe is already decimated by the effect of the cattle-plague. The Wataturu, formerly cattle-rearing nomads, have been compelled by the loss of their cattle to take to agriculture, though but a small number still survive. The Wafiomi, agriculturalists living south of Lake Manyara, speak a unique language, and seem to represent the oldest Hamitic immigration. They live in singular underground dwellings, apparently a modification of the flat-roofed "tembe," itself adopted as less exposed to fire during the attacks of the Masai than other forms. The Wambugwe and Wanyaturu are Bantu immigrants, the former from the south, the latter from the north; while the Wanege are of doubtful origin, but the richness of their language in "clicks" suggests a connection with the Bushmen, or Pygmies. They are a primitive, probably aboriginal, hunting tribe.

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* It is remarkable, also, that the locality should so closely agree with that in which Speke placed his "mountains of the moon," from which he derived the Kagera. It should be mentioned that the author fully appreciates Speke's merit, and dedicates his book to his memory.

The tribes near the Nile sources do not show such a variety, being almost exclusively Bantu and agriculturalists, with the exception of the Watussi, a Hamitic race scattered through the countries west of the Victoria Nyanza. While forming the ruling class in Uganda and elsewhere, in other parts they form a caste of cattle-rearers. Their cattle, marked by the great development of horns, is allied, according to Dr. Adametz, to the "Sanga" of Abyssinia, which confirms the belief in the derivation of the tribe from those parts.* The Bantu tribes on the east and west of the Victoria Nyanza appear to have come from the north, while the Wanyamwesi advanced from the south and separated the two branches of northern immigrants. In speech the Wazinja, etc., west of the lake are related to the Wanyoro, but physically they have felt the influence of the Watussi, who have themselves, however, adopted the speech and mode of life of the peoples among whom they live. The Warundi have been little touched by northern influence. Among them dwell the Watwa, apparently allied to the dwarfs of the Congo forest.

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* As the original home of the Hamites is believed to have been in Asia, so a resemblance has been traced between the skull of the Sanga and one of the varieties of the Indian Zebu.

Dr. Baumann deals in a sensible way with the question of the economic prospects of the country. He insists especially on the necessity of looking forward to the future, as the present products of the country, ivory and slaves, will before long cease to be so, and the present trade route *viâ* Tabora already shows signs of decadence. Agriculture must, therefore, in the main, supply the commerce of the future. Vast expanses of fertile plateau-lands are eminently suited for this purpose, but they are at present unpeopled. The author builds great hopes on a systematic settlement of Wanyamwesi, the most enterprising and intelligent tribe of East Africa, in colonies in suitable localities. This must precede all thought of European settlement. The line which he favours for a railway is that passing south of Kilimanjaro, and *viâ* the Masai plateau to Speke Gulf, as opening the greatest extent of country likely to repay enterprise in the future. The physical difficulties would be less than in the case of the English scheme, while the presence of the suggested colonies would be an immense help towards the carrying out of the undertaking.

CARTOGRAPHIC RESULTS OF DR. BAUMANN'S JOURNEY IN EAST AFRICA.—The four-sheet map which Dr. Baumann has constructed, in conjunction with Dr. B. Hassenstein, from the results of his own surveys combined with previously existing material, has appeared as a supplementary number of *Petermanns Mitteilungen* (No. III.), accompanied by critical remarks on the methods employed in the surveys, and the amount of reliance to be placed on the newly-fixed positions in this part of Africa. Besides the route survey with watch and compass, supplemented by rounds of bearings of prominent objects, Dr. Baumann devoted much attention to astronomical observations, the results of which have been calculated by Dr. L. Ambronn. For a great part of the region traversed they supply for the first time a basis for the accurate construction of a map, and although the exclusive use of the sun for the determination of time and latitude has caused some of the work to be of less value than otherwise, it is pronounced to be, on the whole, an exceedingly valuable contribution to African cartography. The surveys of Captain Spring and Lieut. Werther have also been embodied, and Dr. Hassenstein gives a short *résumé* of the whole body of material available for the mapping of the region in question.

DR. G. M. DAWSON'S OBSERVATIONS ON THE BERING SEA.

IN 1891 Dr. Dawson visited the Bering Sea as one of the British Commissioners in the fur-seal investigations, and on that occasion he made many geological notes, which he has published in the Bulletin of the Geological Society of America (v. 117–146). The Bering Sea, like the Seas of Okhotsk and Japan, is enclosed by an arc of islands, but communicates with the Arctic Sea on the north, as well as with the Pacific. Soundings show, however, that while the south-western part of the sea is very deep (1000 to 2000 fathoms), the north-eastern or Bering Strait region is never more than 100, and is commonly not over

50 fathoms deep; so that an elevation of some 300 feet would raise this continental shelf and unite Asia and America, enclosing the Bering Sea on the north. The Siberian coast has fjord-like inlets at Plover Bay (64° 30′), and behind are bold mountains about 4000 feet high, probably granitic. The land is grey or brownish grey, treeless, and bare except for some green herbage in the valleys. St. Lawrence Island, at the mouth of Bering Strait, is the largest in those regions, being 85 miles long. The granitic rocks have been broken up, as they are on the summits of high hills like Ben Nevis, and cover the surface except in a few places where moorland or grass occurs. The other islands on this continental shelf are of old volcanic origin without modern cones, and treeless, although occasional stunted shrubs grow in the valleys and on the grassy surfaces. No traces of raised beaches nor of glaciation were observed. The Kamchatka peninsula has numerous active volcanoes, several of which are over 10,000 feet high, with snow-covered upper slopes. Below them there is a hilly country, which must have been subject to denuding forces for a very long period. At Cape Chipunski there is evidence of a plane of marine denudation at 600 to 800 feet, and the valleys which cut through the underlying rocks end abruptly 50 to 100 feet above the present level; so that there has probably been a depression of 600 to 800 feet, followed by an elevation to within 50 to 100 feet of the present level, which has subsequently been raised. St. Matthew Island on the Bering shelf has every appearance of being the unsubmerged remnant of hills like those of Kamchatka.

The Commander Islands form the western part of the chain of islands enclosing the Bering Sea; they appear never to have been visited until the Russians discovered them in 1741. Bering Island is 95 nautical miles from the Kamchatka shore, is 50 miles long, and is separated from Copper Island by a channel of 26 miles. The northern part of Bering Island, 20 miles in breadth, is tundra-like, but the narrower southern part is hilly, rising to 1000 feet. Copper Island is a single mountain range, 30 miles long and 5 miles broad, formed of volcanic rocks, but without a trace of crater or cone. Terraces occur at Glinka village up to 600 or 700 feet. Copper is found in the island, usually in nuggets or pellets along the coast. The climate is cool and moist and less rigorous than in the east of the Bering Sea for the same latitude. There are no shrubs nor trees, but luxuriant herbs and grasses grow where there is soil. The Russians have several settlements on both islands, but most of them are broken up in winter.

The Aleutian Islands are separated from the Commander group by a wide and very deep channel. They crown a sharp submarine ridge, the 1000-fathom contour clinging close to the shore on both sides of the chain for half its length, but at the east end they rise from the continental shelf as a continuation of the Alaskan peninsula. Volcanic

activity seems past its most active period in those islands, for no tapering cones like those of Kamchatka now exist, and most of the hills have been rounded by denudation. The most western island, Attu, rises to 3084 feet, and, like the other islands also, it has steep grassy slopes. A faint horizontal line is indicated at 300 feet, where the old sea cliffs rise above a gravelly flat 20 to 30 feet high. In the more eastern islands there is no trace of beach-lines. The hills are covered with snow, the exposed rocks are coloured, and the herbage a vivid green, but trees grow nowhere. There are no traces of glaciation.

The most important fossils from a geographical point of view are those of the mammoth, found on the Pribilof group and on Unalaska of the Aleutians. Mammoth remains have been found in various other parts of Alaska, but always in the flat, unglaciated part; and this localization of the distribution of these fossils points to the past land connection of Asia and America, which a change of level of only 300 feet might have brought about.

There was no polar ice-cap in these regions, and the nearest glacier was that of the Cordillera, stretching 1200 miles along the Rocky Mountains, from 48° to 63° N., and extending to a breadth of 400 miles. Dr. Dawson has now traced out not only the south-eastern but also the north-western flow of this ice. Middleton, a small island near Prince William Sound, consists entirely of boulder clay, and probably is of morannic origin, and at the seaward edge of the Cordilleran ice-field.

THE PHYSICAL CONDITION OF THE OCEAN.*

You will not be surprised if, having called upon an hydrographer to preside over this Section, he takes for the subject of his review the Sea. Less apparently interesting, by reason of the uniformity of its surface, than the land which raises itself above the level of the waters, and with which the term geography is more generally associated, the ocean has, nevertheless, received much attention of later years. In Great Britain, especially, which has so long rested its position among the nations upon the wealth which our merchant fleets bring to its shores, and upon the facilities which the sea affords for communication with our numerous possessions all over the globe, investigation into the mysteries, whether of its ever-moving surface or of its more hidden depths, has been particularly fascinating. I purpose, therefore, to attempt a brief survey of our present knowledge of its physical condition.

The very bulk of the ocean, as compared with that of the visible land, gives it an importance which is possessed by no other feature on the surface of our planet. Mr. John Murray, after a laborious computation, has shown that its cubical extent is probably about fourteen times that of the dry land. This statement appeals strongly to the imagination, and forms, perhaps, the most powerful argument in favour of the view, steadily gaining ground, that the great oceans have in the main existed in the form in which we now see them since the constituents of the earth settled down into their present condition. When it is considered that the whole of the dry land would only fill up one-third of the Atlantic Ocean, the enormous disproportion of the two great divisions of land and sea becomes very apparent.

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* Address to the Geographical Section of the British Association, by Captain W. J. L. Wharton, R.N., F.R.S., President of the Section, Oxford, August 9, 1894.

The most obvious phenomenon of the ocean is the constant horizontal movement of its surface waters, which in many parts take well-defined directions. These great ocean currents have now been studied for many years, and our knowledge of them is approaching a point beyond which it is doubtful whether we shall ever much advance, except in small details. For though, while indisputably the waters continually move in each great area in generally the same direction, the velocities vary, the limits of the different streams and drifts vary, mainly from the ever-varying force and direction of the winds. After long hesitation and much argument, I think it may be now safely held that the prime motor of the surface current is the wind. Not, by any means, the wind that may blow, and even persistently blow, over the portion of water that is moving, more or less rapidly, in any direction, but the great winds which blow generally from the same general quarter over vast areas. These, combined with deflection from the land, settle the main surface circulation.

I do not know if any of my hearers may have seen a very remarkable model, devised by Mr. Clayden, in which water disposed over an area shaped like the Atlantic, and sprinkled over with lycopodium dust to make movement apparent, was subjected to air impelled from various nozzles, representing the mean directions of the permanent winds. It dispelled the last doubt I held on the subject, as not only were the main currents reproduced, but the smaller effects and peculiarities of the Atlantic drifts were produced with surprising accuracy.

There is a small current, long shown on our charts, but which I had always regarded with suspicion. I refer to the stream which, after travelling from the Arctic Ocean southward along the east coast of Greenland, turns sharply round Cape Farewell to the northward into Davis Straits, where it again doubles sharply on itself to the southward. This is exhibited, in the model, in all its details, and is evidently caused by the pressure of the water forced by the mimic Gulf Stream into the Arctic region, where it has no escape except by this route, and is pressed against the land, round which it turns as soon as it can. This is, no doubt, the explanation of the real current. The very remarkable winter equatorial current, which runs in a narrow belt eastwards, just north of the main stream travelling west, was also reproduced with extraordinary fidelity.

The winds, however, that are ordinarily considered permanent vary greatly, while in the monsoon areas the reversal of the currents caused by the opposite winds exercise a great influence on the movements of the water far beyond their own limits, and anything like a prediction of the precise direction and rate of an oceanic stream can never be expected. The main facts, however, of the great currents can be most certainly and simply explained in this manner. The trade winds are the prime motors. They cause a surface drift of no great velocity over large areas in the same general direction as that in which they blow. These drifts, after meeting and combining their forces, eventually impinge on the land. They are diverted and concentrated, and increase in speed. They either pour through passages between islands, as into the Caribbean Sea; are pressed up by the land, and escape by the only outlets possible—as, for example, the Strait of Florida, and form a great ocean current like the Gulf Stream—or, as in the case of the Agulhas current and the powerful stream which runs north along the Zanzibar coast, they are simply pressed up against and diverted by the land, and run along it with increased rapidity. These rapid currents are eventually apparently lost in the oceans, but they in their turn originate movements of a slower character, which, on again passing over shallow water or on meeting land, develop once more into well-defined currents.

We find an analogous state of things on the western side of the Pacific, where the Japan current is produced in a similar manner.

The fact that on all western shores of the great oceans towards which the trade winds blow we find the strongest currents running along the coast, is almost enough of itself to prove the connection between them. The westerly winds that prevail in higher northern and southern latitudes are next in order in producing great currents. From the shape of the land, they in some cases take up and continue the circulation commenced by the trade winds; in others they themselves originate great movements of the water. Compared to the great circulation from this source the effect of differences of temperature or of specific gravity is insignificant, though no doubt they play their part, especially in causing slow under-circulation, and in a greater degree the vertical mixing of the lower waters. No drop of the ocean, even at its greatest depth, is ever for one moment at rest.

Dealing with minor points, the American officers of the Coast and Geodetic Survey have found, after long and patient investigation, that the velocity of the Gulf Stream in its initial and most marked part, the Strait of Florida, is greatly affected by the tide, varying as much as one-half its maximum rate during the twenty-four hours. These American investigations are of greatest interest. They have extended over the whole area of the Caribbean Sea and its approaches, the Gulf of Mexico, and the Gulf Stream proper and its vicinity. In no other part of the ocean has observation of this detailed character been carried out, and they throw a great light on oceanic circulation. The *Blake*, the vessel specially fitted for the purpose, has during the several years in which she was employed on this work anchored in over 2000 fathoms of water, or a depth of considerably more than two miles; a feat which would a short time ago have been deemed impossible. One great point that has come out very strongly is the continual variation in the strength and direction of the currents, and the varying depths to which the surface current extend.

Eastward of the chain of the Windward Islands the general depth of the surface movement may be said to be about 100 fathoms, below which tidal influence is very distinct. There is also a very plain backward flow of water, at depths which vary, caused by the submarine ridge which connects the Windward Chain of the West Indian Islands. These observations also generally support what I have already mentioned; that the velocity of a current depends on the strength of winds, possibly thousands of miles distant, which have given the original impetus to the water, and this, combined with tidal action when the current approaches or runs along a coast, will always cause uncertainty on the resultant velocity.

Dealing for yet another moment with the Gulf Stream, there are two points which have not been much dwelt upon, but which have a great effect on its power of bringing the modifying influence of its warm water as far as our shores. The first is the prevention of its spreading, as it leaves the Strait of Florida, by the pressure of the portion of the equatorial current which, unable to get through the passages between the Windward Islands, is diverted to the north of the Bahamas, and bears down on the eastward side of the Gulf Stream proper, compressing it between itself and the cold water flowing southward along the American coast, and at the same time adding to its forces and maintaining its high temperature. The second is that by the time the Gulf Stream has lost its velocity as a current, in about the vicinity of the Bank of Newfoundland, it has arrived in the region of the westerly winds—that is, of winds whose average direction is from west—whose influence, causing a surface drift somewhat comparable to that of the trade winds, bears the water onward to the British Islands and Norway. Without these prevailing westerly winds the warm water of the Gulf Stream would never reach these shores.

The depth to which the surface currents extend in other parts is little known. Direct observations on under-currents have been rare. In the first place, it is not an easy observation to make. Apparatus has generally to be improvised. This has usually consisted of some form of flat surface lowered to the required depth, and suspended in the water by a buoy, which presents to the resistance of the upper stratum a very much smaller area than that of the surface below. More perfect machines have been devised, notably, that used by the Americans in their West Indian experiments. These, however, are delicate, and require so much care and experience in working, and so much time is wanted for such observations, that under the pressure of the more urgent requirements on surface movements in the interests of navigation very little has been done. The *Challenger* made some observations on the depth of the equatorial current in mid-Atlantic, but they were not very conclusive for lack of suitable appliances. They, however, tended to show that below 100 fathoms there was but little current.

It has been calculated theoretically that winds blowing steadily in one direction with the ordinary force of the trade winds would in 100,000 years by friction between the particles put the whole of a mass of water 2000 fathoms deep, not otherwise influenced, into motion in that direction; but the direction and force of the trade winds are ever changing, and the actual strong currents of the ocean are not in the trade wind areas, but are the result of these drifts meeting one another and being compressed by the conformation of the land. We cannot, therefore, expect this theoretical effect to be realized.

One instance of the underrunning of one current by another is brought very plainly to our notice in the North Atlantic, to the east of the Great Banks of Newfoundland, where the icebergs borne by the arctic current from Baffin Bay pursue their course to the southward across the Gulf Stream running eastward. These great masses of ice floating with seven-eighths of their volume under the surface, draw so much water that they are all but wholly influenced by the under-current. A large berg will have its bottom as much as 600 or 700 feet below the surface. The only reason that these bergs continue their journey southward is the action of the cold under-current.

It was my good fortune to be ordered in 1872 to undertake a series of experiments of the currents and under-currents of the Dardanelles and Bosporus. They proved most interesting. It was well known that a surface stream is almost continuously passing out of the Black Sea through the Bosporus into the Sea of Marmara, and again through the Dardanelles into the Mediterranean. Certain physicists, of whom Dr. W. Carpenter was one, were, however, of opinion that a return current would be found under the surface running in the opposite direction, and this I was enabled to demonstrate. Though from the imperfection of our apparatus, which we had to devise on the spot, we were unable to exactly proportionate the quantities of water moving in the two directions, we found, whenever the surface current was rushing south-westward through these straits, that for a certain distance, from the bottom upwards, the water was in rapid motion in the opposite direction. It was an astonishing sight to behold the buoys, which supported a wooden framework of 36 square feet area, lowered to depths from 100 to 240 feet, tearing up the straits against a strong surface current of as much as 3 and 4 miles an hour. It was as perfect an ocular demonstration of a counter under-current as could be wished, and the Turks, who watched our proceedings with much suspicion, were strongly of opinion that the devil had a hand in it, and only the exhibition of the Sultan's firman saved us from interruption. In the investigation of these currents we found, as usual, that the wind was the most potent agent. Though the surface water from the Black Sea is almost fresh, and the bottom water of the heavy Mediterranean density of 1·027, it was found that when calm had prevailed the surface current slackened, and at times became nil, whilst the under-current responded by a similar slackening.

The ordinary condition of wind in the regions of the Black Sea and Sea of Marmara is that of a prevalent north-east wind. This causes a heaping up of the water on the south-west shores of those seas, precisely where the straits open, and the surface water therefore rapidly escapes. These straits no doubt present abnormal characters, but, so far as surface currents are concerned, the long series of observations then made convinced me of the inadequacy of differences of specific gravity, which were here at a maximum, to cause any perceptible horizontal flow of water. I have said that we were unable to define by direct observation the exact position of the dividing line between the opposing currents, but the rapid change in the specific gravity at a certain depth, which varied on different days, gave a strong indication that the currents changed at this point. A Russian officer, Captain Makaroff, afterwards made similar experiments in the Bosporus, but with more perfect appliances, and he found that at the point where the specific gravity changed the currents also changed.

I have been anxious to obtain similar observations at the Straits of Babel Mandeb, the southern outlet of the Red Sea, where somewhat similar conditions prevail. Here the winds are governed by the monsoons. For half the year the wind blows from the north down the whole length of the sea, causing a surface flow outwards into the Gulf of Aden, and a general lowering of the whole level of the sea of about 2 feet. For the other half of the year the wind at the southern end of the sea is strong from the south-east, causing a surface set into the Red Sea, over which the general level of the water rises, while the northerly wind continues to blow throughout the northern half. At either of these times I think it is highly probable that there is an undercurrent in the opposite direction to that at the surface, but unfortunately the sea disturbance is great and observations are very difficult. Observations were, however, made by Captain W. U. Moore in H.M.S. *Penguin*, in 1890, but at a time when the change of monsoon was taking place. The result was peculiar, for it appeared that at a depth of about 360 feet the movement of the water was tidal, while the surface water was moving slowly in one direction—a result generally similar to that obtained by the Americans in the West Indies—but the direction of the tidal flow was directly opposite to what might have been expected, viz. the water ran in while the tide fell, and *vice versâ*. More observations are, however, needed here before any certain conclusions can be formed.

The depth of the ocean is the next great feature which demands attention. On this our knowledge is steadily, though slowly, increasing. The whole of it has been gained during the last fifty years. Commenced by Sir James Ross, whose means were very small, but who nevertheless demonstrated that the so-called unfathomable ocean was certainly fathomable everywhere, the sounding of the ocean has continuously proceeded. The needs of submarine cables have constantly demanded knowledge in this particular, and the different cable companies have had a large share in ascertaining the facts. Expeditions, whose main object has been to obtain soundings, have been sent out, Great Britain and the United States taking the first place; but most maritime nations have aided. In the immediate past the additions have mainly been from the soundings which H.M. surveying ships continually take whenever on passage from one place to another, from the work of our cable companies, and from United States vessels. We have, as a result, a very fair general knowledge of the prevailing depths in the Atlantic, but of the Indian and Pacific Oceans it is very fragmentary. We have enough to give us a general idea, but our requirements increase as years roll on. It is a vast task, and, it may be safely said, will never be completed; for we shall never be satisfied until we know the variations of level under the water as well as we know those on the dry land.

It is hopeless to do more than to briefly sketch the amount of our knowledge. First, as to the greatest depths known. It is very remarkable, and from a geological point of view significant, that the very deepest parts of the ocean are not in or near their centres, but in all cases are very near land. One hundred and ten miles outside the Kurile Islands, which stretch from the northern point of Japan to the north-east, the deepest sounding has been obtained of 4655 fathoms, or 27,930 feet. This appears to be in a deep depression, which runs parallel to the Kurile Islands and Japan; but its extent is unknown, and may be very large. Seventy miles north of Porto Rico, in the West Indies, is the next deepest cast known, viz. 4561 fathoms, or 27,366 feet; not far inferior to the Pacific depth, but here the deep area must be comparatively small, as shallower soundings have been made at distances 60 miles north and east of it. A similar depression has been sounded during the last few years west of the great range of the Andes, at a distance of 50 miles from the coast of Peru, where the greatest depth is 4175 fathoms. Other isolated depths of over 4000 fathoms have been sounded in the Pacific. One between the Tonga or Friendly Islands of 4500 fathoms, one of 4478 fathoms near the Ladrones, and another of 4428 fathoms near Pylstaart Island, all in the Western Pacific. They all require further investigation to determine their extent. With these few exceptions, the depth of the oceans, so far as yet known, nowhere comes up to 4000 fathoms, or four sea miles; but there can be little doubt that other similar hollows are yet to be found.

The sea with the greatest mean depth appears to be the vast Pacific, which covers 67 millions of the 188 millions of square miles composing the earth's surface. Of these 188 millions, 137 millions are sea, so that the Pacific comprises just one-half of the water of the globe, and more than one-third of its whole area. The Northern Pacific has been estimated by Mr. John Murray to have a mean depth of over 2500 fathoms, while the Southern Pacific is credited with a little under 2400 fathoms. These figures are based on a number of soundings which cannot be designated otherwise than very sparse.

To give an idea of what remains to be done, I will mention that in the eastern part of the Central Pacific there is an area of 10,500,000 square miles in which there are only seven soundings, whilst in a long strip crossing the whole North Pacific, which has an area of 2,800,000 square miles, there is no sounding at all. Nevertheless, while the approximate mean depth I am mentioning may be considerably altered as knowledge increases, we know enough to say that the Pacific is generally deeper than the other oceans. The immensity, both in bulk and area, of this great mass of water is difficult to realize; but it may assist us when we realize that the whole of the land on the globe above water-level, if shovelled into the Pacific, would only fill one-seventh of it. The Indian Ocean, with an area of 25,000,000 square miles, has a mean depth, according to Mr. Murray, of a little over 2000 fathoms. This also is estimated from a very insufficient number of soundings. The Atlantic, by far the best-sounded ocean, has an area of 31,000,000 square miles, with a mean depth of about 2,200 fathoms.

The temperature of this huge mass of water is an interesting point. The temperature of the surface is most important to us, as it is largely on it that the climates of the different parts of the world depend. This is comparatively easy to ascertain. We know so much about it that we are not likely to improve on it for many years. We are quite able to understand why countries in the same latitude differ so widely in their respective mean temperatures; why fogs prevail in certain localities more than others; and how it comes about that others are subject to tempestuous storms. On the latter point nothing has come out plainer from recent discussion than the fact that areas where great differences of surface temperature of the sea prevail are those in which storms are generated. It is a matter of observation that in the region south of Nova Scotia and Newfoundland many of the storms which travel over the Atlantic to this country have their rise. An examination of surface temperature shows that in this region the variations are excessive, not only from the juxtaposition of the warm water of the Gulf Stream and the cold water of the Arctic current flowing southward inside of it, but in the Gulf Stream itself, which is composed of streaks of warm and colder water, between which differences of as much as 20° Fahr. exist. The same conditions exist south of the Cape of Good Hope, another well-known birthplace of storms. Here the Agulhas-current of about 70° Fahr., diverted by the land, pours into the mass of water to the southward, colder by some 25°, and the meeting-place is well known as most tempestuous. South-east of the Rio de la Plata is another stormy area, and here we find the same abnormal variations in surface temperature. Yet another is found off the north-east coast of Japan with the same conditions. These differences are brought about by the mingling of water carried either by the flowing of a powerful current turned by the land into a mass of water of different temperature, as is the case off the Cape of Good Hope, or by the uprising of lower strata of cooler water through a shallow surface stream, as appears to be the case in the Gulf Stream.

A remarkable point recently brought to light by the researches of Mr. John Murray in Scotch lochs is the effect of wind on the surface temperature. It has been observed that wind driving off a shore drifts the surface water before it. This water is replaced by the readiest means, that is to say, by water from below the surface rising to take its place. As the lower strata are in all cases cooler than the surface, a lowering of the temperature results, and we find, in fact, that near all sea-shores off which a steady wind blows the water is cooler than further to seaward. This has an important bearing on coral-growth, and explains why on all western coasts of the great continents off which the trade winds blow we find an almost absolute dearth of coral, while on the eastern coasts, on which warm currents impinge, reefs abound, the coral animal flourishing only in water above a certain temperature.

Observations of the temperature of the strata of water between the surface and bottom have been of late years obtained in many parts. Compared with the area of the oceans they are but few, but our knowledge steadily increases every year. The subject of the vertical distribution of temperature has not yet been thoroughly investigated in the light of the whole of the information which we now possess, but Dr. Alex. Buchan has been for some time devoting his spare time to the task, and it is a heavy labour, for the data obtained here and there over the world by different ships of all maritime nations are very difficult to collect and to appraise, but I understand that before long we shall have the result, which will prove very interesting, in the last volume of the *Challenger* series.

It will readily be understood that observations on temperatures at great depths require great care. In the first place, the thermometers must be most carefully manufactured. They must be subjected to rigorous tests, and they must be carefully handled during the operation. All observations are not of the same value, and the discussion, therefore, presents considerable difficulty and demands much discretion. In the mean time we can state certain known facts. We have learnt that the depth of the warm surface water is small. In the equatorial current between Africa and South America, where the surface is of a temperature of 78°, at 100 fathoms it is only 55°, a difference of 23°, and a temperature of 40° is reached at 400 fathoms. In this region, so far as knowledge goes, the fall in temperature as we descend is most rapid, but generally speaking the same variations prevail everywhere. In the tropical Pacific the temperature falls 32° from the surface, where it stands at 82°, to a depth of 200 fathoms, 40° being reached at from 500 to 600 fathoms below the surface. Below the general depth of 400 to 600 fathoms, the temperature decreases very slowly, but there is considerable variation in the absolute amount of it when we get to great depths in different parts of the ocean.

One of the most interesting facts that has been recognized is, that in enclosed hollows of the ocean the bottom temperature is apparently much less than that of the stratum of water at a corresponding depth in the waters outside the submarine ridge that forms the enclosing walls, separating them from deeper areas beyond; and is, in all cases that have been observed, equal to that on the ridge. From this fact we are enabled to supplement our imperfect knowledge of depths, because if, in a certain part of an ocean, we find that the temperature at great depths is higher than we know exists at similar depths in waters apparently connected, we can feel certain that there is a submarine ridge which cuts off the bottom waters from moving along, and that the depth on this ridge is that at which is found the corresponding temperature in the outer waters. As a corollary we also assume that the movement of water at great depths is confined to an almost imperceptible movement, for if there was a motion that we could term, in the ordinary acceptation of the word, a current, it would infallibly surmount a ridge and pour over the other side, carrying its lower temperature with it. A notable instance is the bottom temperature of the North Atlantic. This is nowhere below 35° Fahr., although the depths are very great. But in the South Atlantic, at a depth of only 2800 fathoms the bottom temperature is but a little above 32° Fahr., and we are therefore convinced that somewhere between Africa and South America, though soundings do not yet show it, there must be a ridge at a depth of about 2,000 fathoms. We also come to the same conclusion with regard to the eastern and western portions of the South Atlantic, where similar differences prevail. Again, the few temperatures that have been obtained in the eastern South Pacific show a considerable difference from those in the South Atlantic, and we are compelled to assume a ridge from the Falkland Islands to the Antarctic continent.

It is interesting that the investigation into the translation of the great seismic wave caused by the eruption of Krakatoa in 1883 led to a similar and entirely independent conclusion. The wave caused by the explosion in the Straits of Sunda reached Cape Horn, where by good chance a French meteorological expedition had erected an automatic tide-gauge, but instead of one series of waves being marked on the paper there were two. A little consideration showed that, the South Pole having directly interposed between Sunda Straits and Cape Horn, the waves diverted by the land about the pole would arrive from both sides. One wave, however, made its appearance seven hours before the other. Study showed that the earliest wave coincided in time with a wave travelling on the Pacific side of the pole, with a velocity due to the known depth, while the later wave must have been retarded in its journey *viâ* the South Atlantic. The only possible explanation is that the wave had been impeded by comparatively shallow water. The evidence from bottom temperature was then unknown, and thus does one branch of investigation aid another.

In the Western Pacific the water is colder, a few bottom temperatures of a little over 33° Fahr. having been found in the deep trough east of the Tonga Islands; but the North Pacific, though the deeper ocean—of enormous area and volume—is apparently again cut off by a submarine ridge. The north-western part of the Indian Ocean is for similar reasons assumed to be divided from the main body, the shallower water probably running from the Seychelles to the Maldive Islands.

Mr. Buchanan has pointed out why some parts of oceans, deep and vast though they be, are, when cut off from communication with others, warmer at the bottom. Water can only sink through lower layers when it is the heavier, and though a warm surface current becomes from evaporation denser, its heat makes it specifically lighter than the strata below. It is only when such a current parts gradually with its heat, as in travelling from tropical to temperate regions, that it sinks and slowly but surely carries its temperature with it, modifying the extreme natural cold of the bottom layers. In the North Atlantic and Pacific we have such a condition. The great currents of the Gulf Stream and Japan current, as they flow to the north, sink, and in the course of ages have succeeded in raising the bottom temperature three or four degrees. In the southern seas this influence is not at work, and, directly connected with the more open water round the South Pole, there is nothing to carry to the abysmal depths any heat to raise them from their normal low temperatures, due to the absence of any heating influence. The ice masses round the South Pole have probably little or no effect on bottom temperature, as the fresher, though colder, water will not sink; and, as a matter of fact, warmer water is found at a few hundred fathoms than at the surface. The lowest temperature ever obtained was by Sir John Ross in the Arctic Ocean in Davis Straits at a depth of 680 fathoms, when he recorded a reading of 25° F. This probably requires confirmation, as thermometers of those days were somewhat imperfect. In the great oceans the greatest cold is found on the western side of the South Atlantic, where the thermometer stands at 32·3° Fahr., but temperatures of 29° Fahr. have been obtained of recent years east of the Færoe Islands, north of the ridge which cuts off the deeper waters of the Arctic from the Atlantic.

Though scarcely within the limits of my subject, which is the sea itself, I must say a few words on the sea floor. The researches carried on in the *Challenger* revealed that, while for a certain distance from the continents the bottom is composed of terrestrial detritus, everywhere in deep water it is mainly composed of the skeletons or remains of skeletons of the minute animals that have lived in the water. In comparatively small depths we find remains of many shells. As the depth increases to 500 fathoms or so we get mainly the calcareous shells of the globigerinæ, which may be said to form by far the greater part of the oceanic floor. In deeper water still, where pressure, combined with the action of the carbonic acid, has dissolved all calcareous matter, we find an impalpable mud with skeletons of the silicious radiolaria of countless forms of the greatest beauty and complexity. Deeper still, *i.e.* in water of—speaking generally—over 3000 fathoms, we find a reddish-coloured clayey mud, in which the only traces of recognizable organic remains are teeths of sharks and cetacea, many belonging to extinct species. What the depths of these deposits may be is a subject of speculation. It may be that some day, as mechanical appliances are improved, we shall find means of boring, but up to the present no such operation has been attempted.

On the specific gravity of the water of the sea I can say but little except that it varies considerably. It is not yet known for certainty how far the specific gravities observed at various points and depths remain appreciably constant. In localities where evaporation is great, and other influences do not interfere, it is evident that the specific gravity of the surface will be high; a consideration which observations confirm, but there are many complications which require more observation before they can be resolved. In some few places repeated observations permit deductions, but, taking the sea as a whole, we are yet very ignorant of the facts bearing on this point.

The waves which for ever disturb the surface of the sea demand much study. The greatest of these, and the most regular, is the tidal wave. On this many powerful intellects have been brought to bear, but it still presents many unsolved anomalies. Lord Kelvin and Professor Darwin have demonstrated that the tidal movement is made up of many waves depending upon different functions of the moon and sun, some being semi-diurnal, some diurnal. The time of transit over the meridian, the declination of both bodies, create great variations; the changing distance and position of the moon and the position of her node also have great effect, while the ever-varying direction and force of the winds, and the different pressure of the atmosphere play their part, and sometimes a very large part, on what is somewhat loosely known as the meteorological tide. The amplitude of the oscillation of the water depending upon each of the astronomical functions varying for every point on the earth, the effect is that, each having a different period, the resulting mean movement of the water has most astonishing variations. In some places there is but one apparent tide in the day; in others this phenomenon only occurs at particular periods of each lunation, while in the majority of cases it is the movements of each alternate tide only that appear to have much to do with one another. Though after long observation made of the times and ranges of tides at any one spot, they can now be predicted with great accuracy, for that particular place, by the method of harmonic analysis, perfected by Professor G. Darwin, the meteorological tide excepted, no one can yet say what the tide will be at any spot where observations have not been made.

Observations all over the world have now shown that there is no part where the tidal movement is so regular and simple as around the British islands. This is more remarkable when it is found that the tides on the other side of the Atlantic—at Nova Scotia, for instance—are very complicated. The minor tides, which in most parts of the world, when combined in one direction, amount to a very considerable fraction of the principal lunar and solar tides, and consequently greatly increase or diminish their effects, are in Great Britain so insignificant that their influence is trifling; but why this should be I have never yet found any one to explain. Nevertheless there are many very curious points about our tides which are plainly caused by interference, or, in other words, by the meeting of two tidal waves arriving from opposite directions, or from the rebound of the tidal waves from other coasts. This effect, also, it has been so far found impossible to predict without observation. On our southern coasts, for instance; in the western part the tide rises about 15 feet, but as it travels eastward the range becomes less and less until, about Poole, it reaches a minimum of 6 feet. Further east again it increases to Hastings, where the range is 24 feet. Yet further east it again gradually diminishes. This is due to the reflection from the French coast, which brings another wave which either superposes itself upon, or reduces the effect of, the main tide advancing up the English Channel; but the details of such reflection are so complex that no one could forecast them without more knowledge than we possess. There can be little doubt that to this cause, reflection, is mainly due the variations in the amount of mean range of tide which are found on many coasts at different parts; and as these reflected waves may arrive from great distances, and be many in number, we may cease to wonder at the extraordinary differences in range of tide which prevail, though it will be understood that this is wholly separate from the varying heights of each successive tide, or of the tide at different parts of each lunation, or at different times of the year, which depend upon the astronomical influences.

The actual height of the tide in deep water is small, but on passing into shallow water when approaching a shore, and especially when rolling up a gulf of more or less funnel shape, it becomes increased by the retardation caused by friction, and by compression laterally, and hence the height of the tide on a coast affected by other causes is greater than in the open sea. The oceanic tide wave is supposed to be from 2 to 3 feet in height, but as this has been assumed from observations made at small oceanic islands where, although the magnifying influences mentioned are at a minimum, they still exist, we wait for precise information until some means of actually measuring the tide in deep water is devised.

The waves due to wind, though not so far-reaching in their effects as the majestic march of the tide wave, are phenomena which are more apparent to the traveller on the ocean. The deep sea in a heavy gale presents, perhaps, the most impressive manifestation of the powers of nature which man can behold, and doubtless many of us have experienced feelings that may vary from awe and wonder to sheer delight, according to the temperament of each individual, at for the first time finding himself face to face with this magnificent sight, though I rather fear that discomfort is the prevailing feeling that many carry away. The height to which storm waves may rise has never been very satisfactorily determined. Apart from the difficulty of the task and the small number of people who will address themselves to it when they have the chance, it is but rarely that any individual sees really abnormal waves, even though he may be at sea all his life. Different heights for what are called maximum waves have been recorded, and they vary from 40 to 90 feet from crest to hollow. All we can say is that the most probable figure is about 50 or 60 feet. These great storm waves travel very far. In some cases they convey a warning, as their velocity always far exceeds that at which the storm is travelling. In others they intimate that a gale of which no more is seen has occurred somewhere—it may be many miles distant. When they have travelled beyond the limits of the wind which raised them, they lose the steepness of slope which characterizes them when under its influence, and become an undulation which is scarcely noticed when in deep water. On approaching shallow water, however, they are again apparent, and the "rollers" that occur unperiodically at various places in latitudes where gales never occur would seem to be caused by such waves, originating in areas many thousands of miles distant. Such appears to be the origin of the well-known rollers at Ascension and St. Helena, where the rocky and exposed nature of the landing has caused this phenomenon to be especially noticed.

Other rollers are, however, undoubtedly due to earthquakes or volcanic eruptions occurring in the bed of the sea. Many of the great and sudden waves which have caused devastation and great loss of life on the shores of western South America are referable to this cause. Observations to enable the focus of such a disturbance to be traced have generally been lacking, but it is probable that where the wave has been large the point of origin has not been far distant. In one notable instance the conditions were reversed. The point of origin was known and the distance to which the resulting wave travelled could be fairly satisfactorily traced. This was the great eruption in the Straits of Sunda, in August, 1883, which locally resulted in the disappearance of the major part of the island of Krakatoa, and the loss of nearly 40,000 lives, on the neighbouring shores of Java and

Sumatra, by the huge wave which devastated them. The records of automatic tide-gauges and the observations of individuals enabled the waves emanating from this disturbance to be followed to great distances. These waves were of great length, the crests arriving at intervals of about an hour, and moving with a velocity of about 350 miles an hour, were about that distance apart. The waves recorded at Cape Horn were apparently undoubtedly due to the eruption, and travelled distances of 7500 miles and 7800 miles in their course on either side of the south polar land. They were only 5 inches in height above mean level of the sea, while the waves recorded at places on the southern part of Africa, at a distance of about 5000 miles from the scene of the eruption, were from 1 to 2 feet high, the original long waves being of an unknown height, but probably did not exceed 10 or 15 feet. No other such opportunity of testing the distances to which great waves may travel has ever occurred, and as such a catastrophe as gave rise to them could scarcely be repeated without similar loss of life, it may be hoped we shall not live to see another, interesting though the discussion of the numerous phenomena were.

The movement of the particles of water due to the tide wave extends to the bottom of the deepest water, and doubtless plays an important part in keeping up a constant motion in the abysses, but the depth to which the action of the surface waves originating in wind reach is still but little known by observation. If, however, we study the contour of the bottom off the shores of land exposed to the full influence of the great oceans, we are struck by the very general rapid increase of slope after a depth of about 80 to 100 fathoms (500 to 600 feet) has been reached. It appears probable that this is connected with the depth to which wave action may extend, the fine particles brought down by rivers or washed from the land by the attrition of the breakers being distributed and gradually moved down the slope. When we examine banks in the open sea we find, however, that there are a great many with a general depth of from 30 to 40 fathoms, and the question arises whether this may not be the general limit of the power of oceanic waves to cut down the mass acted upon when it is fairly friable.

The question has an interesting bearing on the subject of the ever-debated origin of coral atolls, for this is the general depth of many large lagoons; and granted that the sea can cut down land to this depth, we have at once an approach to the solution of the problem of the formation of bases of a suitable depth and material upon which the coral animal can commence operations. This question also awaits more light, and I merely offer this remark as a suggestion. It is, however, somewhat remarkable that, in recent cases of volcanic islands piled up by submarine eruptions, they have all been more or less rapidly washed away, and are in process of further diminution under the surface.

Observations on the mean level of the sea show that it constantly varies, in some places more than others. This subject has not yet been worked out. In some localities it is plainly due to wind, as in the Red Sea, where the summer level is some 2 feet below that of winter, owing to the fact that in summer the wind blows down the whole length of the sea, and drives the water out. In many places, as in the great estuary of the Rio de la Plata, the level is constantly varying with the direction of the winds, and the fluctuation due to this cause is greatly in excess of the tidal action. In others the cause is not so clear. At Sydney, New South Wales, Mr. Russell found that during eleven years the level was constantly falling at about an inch a year, but by the last accounts received it was again stationary.

The variations in the pressure of the atmosphere play an important part in changes of sea-level. A difference of one inch in the barometer has been shown to be followed by a difference of a foot in the mean level of the sea, and in parts of the world where the mean height of the barometer varies much with the seasons, and the tidal range is small, this effect is very marked.

Of any secular change in the level of the sea little is known. This can only be measured by comparison with the land, and it is a question which is the more unstable, the land or the water—probably the land, as it has been shown that the mass of the land is so trifling, compared with that of the ocean, that it would take a great deal to alter the general mean level of the latter.

All the points connected with the sea that I have had the honour of bringing before you form part of the daily observation of the marine surveyor when he has the chance, but I cannot refrain from also mentioning other duties, which are indeed, in the present state of our knowledge and of the practical requirements of navigation, the principal points to which he has to pay attention, as it may explain why our knowledge on so many interesting details still remains very imperfect.

Working as we do in the interests of the vast marine of Great Britain, the paramount necessity of good navigational charts requires that the production of such charts should be our principal aim. It is difficult for a landsman, and difficult even for a sailor who has never done such work, to realize the time that is necessary to make a really complete marine survey. The most important part, the ascertainment of the depth, is done, so to speak, in the dark—that is to say, it is by touch, and not by sight, that we have to find the different elevations and depressions of the bottom of the sea. In making a map of the land, an isolated rock or hill stands up like a beacon above the surrounding land, and is at once localized and marked, but a similar object under the sea can only be found by patient and long-continued sounding, and may very easily be missed.

When it is considered that marine surveying has only been seriously undertaken for about 100 years, with a very limited number of vessels, we shall, I think, understand how in the vast area of the waters, taking only those bordering the shores, many unsuspected dangers are yearly discovered. Very, very few coasts have been minutely surveyed, and, setting aside for a moment the great changes that take place off shores where sandbanks prevail, I should be sorry to say that even on our own coasts charts are perfect. Yearly around Great Britain previously unknown rocks come to light, and if this is the case at home, what are we to think of the condition of charts of less-known localities? Our main efforts, therefore, are directed to the improvement of charts for safe navigation, and the time that can be spared to the elucidation of purely scientific problems is limited. Nevertheless, the daily work of the surveyor is so intimately connected with these scientific problems that year by year, slowly but surely, we add to the accumulation of our knowledge of the sea.

MORPHOMETRY OF THE LAKE OF CONSTANCE.*

In 1886 the five shore-states of the Lake of Constance appointed a commission for the construction of a map of the lake, which determined the outline of this, the largest of German lakes, by means of new triangulations, and carried out extensive sounding operations in it. The results of these labours were laid down in a map, on the basis of which a calculation of the volume has been made under the direction of Professor A. Penck, in the Geographical Institute of the Vienna University, under the auspices of the Ministry of Public Instruction. Besides this, a discussion has been set on foot by Penck himself, the chief aim of which is to test by an example the applicability of a series of morphometric formulæ, which he has brought together in a chaper of vol. i. (shortly to appear) of his 'Morphology of the Earth's surface,' in the series of geographical handbooks edited by Professor Fr. Ratzel.

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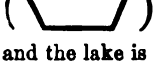
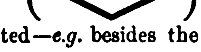
* Communicated by Dr. K. Peucker, of Vienna.

Since morphometric values possess an importance only when compared with the corresponding ones for other forms of the surface, in the following table the principal values for the Lake of Constance are given side by side with the corresponding ones (likewise in great measure newly ascertained) for other Alpine lakes:—

Lakes.	Area in sq. miles.	Volume in cub. miles.	Mean inclination.	Maximum depth in feet.	Mean depth per cent. of the greatest.	Shore development.	Insulosity.
Constance	206·8	11·5	3°(=5·2°/₀)	827	36	3·46	0·01
Geneva	223·8	21·2	—	1014	50	—	—
Garda	139·5	11·9	5⅜°	1135	39	1·83	—
Maggiore	81·5	8·9	—	1220	—	3·26	—
Como	—	—	—	1342	38	3·69	—
Lugano	—	—	—	945	—	3·53	—
Zürich	34·2	0·93	—	469	31	—	—
Chiem	31·5	—	—	—	34	2·33	0·03

Lake.	Greatest distance between points on shore—		Greatest breadth.	Mean breadth.	Circumference.
	In straight line.	Along centre of lake.			
Constance	43 miles	46·5 miles	8 miles	4·47 miles	176·5 miles

While taking the second place among Alpine lakes as regards area (it is only 222 square miles even at high water), it occupies only the third in respect of volume—that of the Lake of Geneva, which so little exceeds it in area, being nearly double; while in the same respect it does not come up to the Lake of Garda, of which the surface is so much smaller, being even at high water only 11·84 cubic miles. This at once shows the slight relative depth of the Lake of Constance, in which it is surpassed by five other Alpine lakes. Moreover, the proportion of the average to the maximum depth is very low in the Lake of Constance, being less only in the Lakes of Chiem and Zürich, while in all the other Alpine lakes of which the volume has yet been calculated it is considerably higher. This figure, expressed by Penck by a percentage, is of especial morphological value, inasmuch as it allows a conclusion to be drawn as to the general form of the basin: if the proportion amounts to half, or 50 per cent., the form is paraboloidal, and thus the lake is "cauldron-shaped" (); but when it is about 33 per cent., the form is pyramidal or conical, and the lake is "funnel-shaped" (). The greater number of the Alpine lakes hitherto investigated—*e.g.* besides the Lake of Geneva given above, that of Brienz (67 per cent.), Annecy, French Alps (65 per cent.), the Mond-see, Salzkammergut (53 per cent.), the Traunsee, Salzkammergut (47 per cent), and others—have cauldron-shaped basins, but the Lake of Constance a funnel-shaped. The relative shallowness of the bed of the Lake of Constance is matched by the gentleness of its slopes (the mean inclination), in which respect it is surpassed not only by the Lake of Garda, but by all the lakes situated in the Alps, as the following table shows:—

Wolfgangsee	5½°	Walchensee	9°
Traunsee	6½°	Kärntner Weissensee	9½°
Thunersee	7½°	Brienzersee	12°
Walensee	8°	Königssee	20½°
Hallstädtersee	8½°		

In order to rightly comprehend the flatness of the bed of the Lake of Constance, one must keep in view the fact that its mean inclination, which amounts to 3° only, would hardly be represented at all on a *hachured* map. The type of ground to which the lake belongs is that of a plain; it is thus out of the question that the basin originated in a rifting of the Earth's crust. This shallowness, moreover, is also closely connected, as Penck shows, with the varied outline of the lake, which is borne out, *e.g.*, by the fact that the Lake of Garda, with its regular outline, is decidedly deeper and has a more steeply sloping bed. The expression for the diversity of outline is the figure which gives the number of times greater the circumference of an area is, than the least amount possible (*i.e.* in the case of a circular outline). Judged by this standard, the Lake of Constance does not, it is true, show the greatest "shore development" among the Alpine lakes—this is exceeded by that of the Lakes of Como and Lugano—but it comes far above that of the Lakes of Chiem, Iseo (2·14), and Garda, and is in fact greater than that of Lake Maggiore. The Lake of Constance is poor in islands; its "insulosity," *i.e.* the proportion of the area of islands to that of the water-surface, is, *e.g.*, three times less than that of the Lake of Chiem. Yet, to compare small with great, it is almost equal to that of the Indian Ocean. The "Swabian Sea" is small in this conjunction, but still large in comparison with almost all the other lakes of the region of the Alps. Thus the "Bavarian Sea" (the Lake of Chiem) is six times smaller than it, and one could fill all the lakes of the Eastern Alps together, with the exception of the Upper Italian, twice over with the water of the Lake of Constance. "Such a difference in volume warns us that the causes which have contributed to the formation of the Lake of Constance are in some respects different from those which have led to the origin of its eastern neighbours."

THE GEOGRAPHICAL DISTRIBUTION AND HABITS OF WHALES.*

By PROFESSOR C. MÖBIUS.

WHALES, as air-breathing mammals, are compelled to remain near the surface of the sea. In order to breathe, they must at least raise their nostrils, which are placed at the highest part of the head, above the water. They are drowned if they get into nets, which keep them under water. Redner asserts positively that the whale blows jets of water neither from the lungs nor from the mouth, but that what is taken for such is either condensed water-vapour or the small amount of water resting in or above the nostrils.

The toothed whales (*Denticete*), which are provided with permanent teeth, feed by preference on fish and cuttlefish; the whalebone whales (*Mysticete*), which have only embryonic teeth, on fish, cuttlefish, and swimming or floating organisms which are found in swarms (Mysids, Copepods, Salpæ, Pteropods, Diatoms, etc.), and which they strain from the water by means of the whalebone structure. The whales move about in search of the animals on which they feed.

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* Address before the Berlin Geographical Society, June 2, 1894.

The most serviceable of the whalebone whales belong to the genus *Balæna*, in which the structure is long, and there is no dorsal fin. The best-known species is *Balæna mysticete*, the Greenland whale, which reaches a length of 62 feet and a weight of 160 tons. It lives in the northern circumpolar sea. In the seventeenth and eighteenth centuries it was common in the neighbourhood of Spitzbergen. It has been taken since the end of the eighteenth century in Davis Straits, and since 1847 in the Behring Sea and near Kamchatka. On the west coast of Greenland it descends to only 64° N. lat. It has become so scarce, however, at the present day, that in the most recent times hardly one a year has been taken.

More to the south, in the North Atlantic and North Pacific Oceans, there are found two species of *Balæna*, with shorter whalebone, and one or more prominences over the centre of the upper jaw. *Balæna Biscayensis* reaches a length of 50 to 53 feet. The Basques used to kill it as far back as the eleventh and twelfth centuries with bows and arrows and harpoons. After becoming very rare, it appeared again in 1854 on the coast of Northern Spain. Between 1889 and 1891 sixteen specimens were killed south of Iceland. It is distributed over the area from the west coast of Norway to the Canaries and the east coast of the United States, and passes also into the Mediterranean.

Balæna Japonica is taken in the North Pacific Ocean, from San Francisco as a base, between 30° N. lat. and the Aleutian Isles; and on the Asiatic coast it is found between Saghalien and Formosa. The Japanese have taken it on their coasts for more than two hundred years with nets and harpoons.

Two species of *Balæna* inhabit the southern hemisphere, viz. *Balæna Australis*, on the coasts of Africa between 36° and 48° S. lat. Isolated specimens are also met with at Cape Horn, on the west coast of South America, and near New Zealand.

Balæna marginata is spread over the space from the west coast of South America as far as New Zealand, South and West Australia. To the north it apparently does not pass 30° S. lat. in any numbers.

The finned whales are not so valuable as the Baleen whales. Their head is shorter, the upper jaw lower, the whalebone is shorter and less elastic. They have on the back an upright membranous fin, and are furrowed on the throat, breast, and belly. Since 1865, great numbers have been killed on the north coasts of Europe with explosive charges, dynamite, etc.

Balænoptera musculus, distributed from Greenland to Novaya Sembla, advances southwards as far as the North Sea and the Baltic, and even to the Mediterranean, in its pursuit of shoals of fish.

Balænoptera Sibboldi, reaching a length of 88 feet and a weight of 160 tons, is the largest denizen of the earth. It is taken between Greenland and Novaya Sembla, and between North America, China, and Japan. Specimens have also been met with at Cape Horn and in the North Sea.

Balænoptera borealis, 43 to 50 feet long, is taken from the Lofoden Islands to Finmark. It feeds chiefly on swimming crabs.

Balænoptera rostrata, the Dwarf Whale, 20 to 30 feet long, distributed from Norway to Greenland and Labrador, lives principally on fish (herrings, etc.).

Megaptera boops, Bunched Whale, reaching a length of 72 feet, with very long pectoral and low dorsal fin. Inhabits the Arctic Sea.

Rachianectes glaucus, Grey Whale, up to 40 feet long, with very short whalebone. Lives in the North Pacific Ocean; it wanders in summer as far as Kamchatka, and in winter to the northern tropic.

Among the toothed whales, the most valuable is the Spermaceti Whale, *Physeter macrocephalus.* The female is 33 to 40 feet, the male up to 72 feet long. It has teeth only in the lower jaw. In the head and back are two cavities filled with liquid fat (spermaceti), and in the intestine ambergris is found. It is hunted principally in the warmer parts of the Atlantic, Indian, and Pacific Oceans, but it also reaches the Polar Seas.

Hyperoodon rostratus, 20 to 30 feet long, allied anatomically to the spermaceti whale, has only a few small teeth in the lower jaw, and is spread from Novaya Zemlya to the east coast of North America. It goes as far north as Spitzbergen in summer, and repairs to more southern waters in winter.

With the same distribution as the spermaceti whale, *Globiceps melas* is found between Norway and the Faeroe Islands in herds of sometimes several thousand individuals. On these islands its chase and the apportionment of it between the authorities and the islanders have, since 1854, been regulated by law. About fifty thousand head are killed there yearly.

The Narwhal (*Monodon monoceros*) is spread over the whole Northern Polar Sea. Off Greenland it is often seen in closely packed herds. The huge left tusk of the male is worked up like ivory.

In the whole Northern Polar Sea, the White Whale also (*Delphinapterus leucas*) is found. Its length is from 10 to 23 feet.

Delphinus tursio, 10 to 13 feet long, has in both jaws twenty-one to twenty-five teeth on each side, and occurs in herds of one to two hundred individuals. Its habitat is the North Atlantic Ocean, where it seldom passes northward of 66° N. lat.

Phocœna communis, the porpoise, or sea-hog, 3 to 5 feet long, with twenty-five to twenty-eight teeth on each side, lives on the coasts of North Europe and Greenland, and is also spread over the whole North Atlantic Ocean. It also enters the North Sea and the Baltic, the Mediterranean, and the Black Sea. It leaves the Baltic in November. Between that month and February, about fifteen hundred head are taken yearly in the Little Belt.

The chase of the whale is a violent encroachment of man on the communities of life on the sea, and the interchange of the materials for its support. If it is continued in the present reckless manner, the largest denizens of the earth will soon belong only to the realm of legend.

THE MONTHLY RECORD.

THE SOCIETY.

Educational Lectures.—It has been arranged by the Council that during next session the third course of educational lectures by Mr. H. J. Mackinder will be delivered in connection with the London University Extension. They will be given at Gresham College on successive Mondays, at 6 p.m., beginning on October 8. The course will consist of twenty-five lectures in all, on the History of Geography and Geographical Discovery. Ten lectures will be given before Christmas, when the Ancient and Mediæval period will be treated; ten between Christmas and Easter, when the Rennaissance and Modern period will be dealt with; and five lectures after Easter, when certain selected books (*e.g.* 'Marco Polo') will be referred to. To these lectures Fellows of the Society will be admitted free.

Society's Prizes to the Cadets of the Training-Ships "Worcester" and "Conway."—The Royal Geographical Society's prizes for proficiency in geography in the late examinations in these training-ships have been awarded as follows:—"Worcester:" Algernon Percy Le Clerc Faught, 1st prize; Joseph Leonard Hall, 2nd prize; Richard Frederick Hayward, Mr. Clements R. Markham's prize. "Conway:" Herbert Raymond Bateman, 1st prize; Thomas Samuel Beauchamp Williams, 2nd prize; George Edward Barton, Mr. Clements R. Markham's prize.

EUROPE.

The Glaciation of the Riesen-Gebirge during the Ice-Age.—The Riesen-Gebirge, the highest extra-Alpine range of Central Europe (Schneekoppe, 5266 feet), lying on the Austro-Prussian frontier, although at the present day far below the climatic snow-limit, was, according to the researches of J. Partsch (*Forschungen zur deutschen Landes u. Volkskunde*, vol. viii. part 2), covered in its higher parts with perpetual snow and glaciers at the time when the inland ice, streaming down from the Scandinavian mountains, reached as far as Scotland, and far over the North-German plain. Unmistakable traces of the same are present in the moraines as well as in the material deposited by the glacier-streams. These traces, considered in connection with the relief of the range, permit the conclusion that the range at that epoch possessed two clearly separated glacier-regions, and, beyond this, point distinctly to two successive periods of glaciation. During the first, the height of the snow-line (determined from the limit-values of the heights of mountains on which glaciers first begin to appear, and of those which have remained free from glaciation) was about 3770 feet, and the two glacier-regions together occupied an area of 32 square miles, of which seventy-two per cent. belonged to the southern (now the Bohemian) portion of the range. From the western field of névé (that from which the Elbe at the present day derives its origin) five glaciers, varying from 1860 to 3280 yards in length, descended, and from the eastern (by far the larger) nine glaciers, of about 2950 to 5800 yards. The extreme tongues of these fourteen ice-streams were placed at an average height of 2950 feet. After this first great ice-period, a decided retreat of the glaciers, and a long epoch marked by a small extent of ice, must have supervened. For not only did the glacier-streams find time in it to chisel out a terrace-system within the materials deposited by themselves, but there was also time enough for a ridge of rock, which so completely separated two neighbouring *Kahren*, that in the first ice-period an entirely independent elongated glacier was derived from each, to be so far worn down, that at the time of the second glaciation the glaciers united in a single short tongue common to both. Of this second ice-period, ten glaciers have left behind moraines which have remained fresher and been preserved in a better-defined form, and at a mean elevation of 490 feet higher, than those of the great ice-period. These were mostly small *Kahr* glaciers, and with them were but a few of the present "Alpine" type, whilst the glacial phenomena of the first period belonged to the so-called "Norwegian" type of the present day. The height of the climatic snow-line must have been about 4430 feet in the second period. An important light is thrown on the climatic conditions of both periods by the fact that the southern aspect shows no traces of any influence unfavourable to the development of glaciers.

The Rhone-Marseilles Canal.—The Rhone and its tributary the Saône form a magnificent natural waterway, connected by a network of canals with all the great rivers of Central and Eastern France, as well as with the Rhine. The shallowness of certain parts of the Rhone has always impeded the passage of boats of considerable draught, but this obstacle has been practically removed by the great engineering works now nearly completed, which ensure an average depth of 5 feet 4 inches during almost all the year. The delta, however, has hitherto presented peculiar difficulties owing to the constant silting up of the mouth. Various attempts have been made to obviate this by extensive dyking and by subsidiary canals, parallel to the course of the river, but having a different outlet. The last great work was intended to be final. Between 1865 and 1870 nearly a million sterling was spent in forming the port of St. Louis du Rhone, near the mouth of the river, and connecting it by a canal with the Gulf of Fos. The anticipations that St. Louis would rival Marseilles were frustrated by malaria and the silting up of the Gulf of Fos. Another cause necessitated direct communication between the Rhone and Marseilles. The tunnelling of the Alps diverted much traffic from Marseilles to Venice, and especially to Genoa. Genoa now rivals Marseilles, its traffic having increased 100 per cent. in the last decade, or five times as much as that of Marseilles. In the *Revue de Géographie*, July, 1894, M. Charles-Roux discusses the proposed new canal with elaborate statistics and many excellent maps. The terminal basin is at the north end of the Marseilles docks. After skirting the shore for some miles, the canal is carried under the Chaîne de l'Estague to the Etang de Berre, whose shore it follows to Martigues. Thence it goes to the Port de Bouc, and follows the course of the Arles canal to the Etang de Oatéjon, from whence it proceeds in a straight line to the Rhone. The length is 34 miles, of which about 4½ are tunnelled underground. The average depth is 10 feet between Marseilles and Port de Bouc, and 6½ feet the rest of the way. The total cost is estimated at £3,200,000. The author shows the importance of the Etang de Berre as a harbour of refuge were Marseilles besieged. This lagoon is a true rock-surrounded gulf, capable of being easily made 30 feet deep by dredging. The formation of a canal to the sea which would float the largest vessels is the most formidable obstacle to the utilization of this magnificent and impregnable natural harbour.

ASIA.

The Identification of Marco Polo's Zipangu.*—We have received from Mr. F. G. Kramp, map curator of the Royal Dutch Geographical Society, the reprint (in English) of an article contributed by him to the Journal of that Society, in which he combats the novel propositions brought forward by Mr. G. Collingridge in the May number of this *Journal*, and ably sets forth the reasons, which should make us decline to give up the orthodox view. Mr. Collingridge, it will be remembered, tried to show that the Zipangu of Marco Polo and the early cartographers was in reality not Japan, as has been believed by all writers of repute since that country was first reached by the Portuguese, but Java. While admitting that the method of inquiry laid down by Mr. Collingridge, "though not new, is irreproachable in itself," the writer holds that a minute examination of his article results in showing "that though the author has gathered several items with great boldness and a skill which cannot be denied, yet most of his arguments are totally at variance with historical truth." Mr. Kramp's main points are as follows: The early European maps, dating from before the arrival of the Portuguese in the Eastern Archipelago (*i.e.* about 1509), were not based on surveys, but only roughly represent the reports of travellers, Ptolemy being their basis, and the remainder almost entirely borrowed from Marco Polo, with minor additions from Oderic, etc., Marino Sanuto's map of 1320 being the only one in which Arab influence is to be traced. Lelewel, Richthofen, Yule, and Wharton all agree as to the slight accuracy of Fra Mauro's delineation of Eastern Asia (1459), so that Mr. Collingridge's statement that "Java, Bali, Lomboc, and Sumbawa, as represented on his Mappamundi, must have been drawn from a portolano," shows his ignorance of the state of cartography of those days, especially as the last three were not heard of in Europe till the sixteenth century, being precisely the last of the Dutch possessions to be discovered. Mr. Collingridge also fails to notice that, so far from connecting Marco Polo's Zipangu with Java, Fra Mauro really also delineates Japan under the name Zimpagu, though from the exigencies of space the two islands are placed in juxtaposition. On the contrary, at the end of his article, while acknowledging that an island Zimpagu is given, he uses the fact to support his own contention, by supposing that, while given to Bali, the name really represents Sumbawa! Again, Mr. Collingridge states that Marco Polo gives the same distance from China (1500 miles) in the case of both Zipangu and Java, supposing from this that the former refers to the Eastern Archipelago; whereas, if we refer to Polo's account, we find that the distance in the first case is reckoned from Central China eastwards, and in the second from Cochin-China (Chamba, *i.e.* Chiampa) southwards, a very important difference. Then as to the greater applicability of Polo's account to Java than Japan—(1) Oderic's description of the palace in Java is not so like Polo's if we follow Cordier's edition of the former (1891); (2) Polo's account is only from hearsay, and both islands have always had a reputation for riches, while, in fact, Japan does produce more gold and silver than Java; (3) the passage about the burning of the dead (how is this applicable to the *Mohammedan* Javanese at the present day?) is found only in the Ramusian version, and is bracketed by Yule; (4) so far from there being the uncertainty as to Kublai Khan's expeditions which Mr. Collingridge would lead one to suppose, an acquaintance with Eastern authorities tells us precisely that two expeditions took place against Japan, in 1274 and 1281 (the latter being the date assigned by Polo), and one against Java, in 1293, when Polo was already on his voyage home. Polo's account agrees well on the whole with what we know from other sources of the expedition of 1281 against Japan. Lastly, as to the idols in Zipangu, and the addiction of the people to the eating of human flesh—in Yule's and Panthier's text the name Zipangu is not mentioned a single time in this reference. Buddhist idols, moreover, would have then been found in Japan as in Java, while Polo himself qualifies the statement as to cannibalism, by saying "that he never was there." The "Sea of Chin" is indeed the southern Chinese sea, but it is only Mr. Collingridge, and not Polo, who states that it is "between Zipangu and China."

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* See also Mr. Yule Oldham's letter, p. 276

Trade in Persia.—The Foreign Office publishes a report on last year's trade in Khurasan. Wheat is smuggled into Russia in enormous quantities, with disastrous results to Persia, which, owing to scarcity of water, produces even in exceptional years only enough wheat for home consumption. The ignorant peasant, needing ready money at the end of the inclement winter, pledges part of next year's crop to Russian speculators at rates so low that Persian wheat is sold in Europe cheaper than wheat grown in Russia. The result is semi-starvation for three-quarters of the population. The Russian customs system is about to be extended from Samarkand into Bokhara, and there is an effort being made to develop Russian trade with Persia. The new tariff will not materially affect British trade, as in the interests of Russian consumers the duties on tea, indigo, muslin, etc., cannot be much increased.

AFRICA.

The Geography of South-West Africa.—Dr. Karl Dove is giving the preliminary results of his investigations into the geography of Damaraland during a stay of eighteen months in that country, in a series of articles in *Petermanns Mitteilungen*. The first two which have appeared (1894, Nos. 3 and 5) deal respectively with the vertical relief of the country and its climate. With regard to the former, Dove corrects the current idea that the whole country may be described as a plateau-land. The southern part of Damaraland (between 21° and 23° S. lat.), to which his remarks specially apply, has as its foundation a vast mass of elevated country rising gradually from the coast to 17° E. long.; but the surface is varied by real mountain-ridges of considerable relative height, usually of great length in proportion to their breadth. Besides these and individual small plateaux of no great extent, the surface is formed of gentle undulations, which, in their most typical form, reach a height of 300 to 500 feet. Southern Damaraland may be divided into four natural regions succeeding each other from west to east. First comes the coast strip of flat land gradually rising towards the interior, mostly desert, except the river-beds, which are often deeply cut below the general level. The eastern limit is little defined except by the gradual change in climate and vegetation. The second region is one of steppes occupying the western slope of the central mass. The general rise of level is most pronounced of all here, the rivers showing a steep fall. Their deeply eroded valleys do not necessarily prove a former greater precipitation, but may be in great measure due to the extraordinary range of temperature between night and day. The mountain-land which forms the third region is of two types: (1) the region of the Otjiseva river, in which the ridges run principally from north to south, compressing the river-basin into a narrow compass; they are the highest and steepest in the neighbourhood of the main valleys, and form a great barrier to communication except in the direction of the latter; (2) the source-region of the Kuiseb, the Khomas-land, an elevated tract with undulations of varying width. The fourth main region is that of the basin of the Nosob, beginning from the water-parting east of Windhoek, and becoming more and more level towards the east. It is traversed by the Elephant river, which flows to the Nosob, and has a fairly copious water-supply, the district being apparently the most rainy of German South-West Africa. The land of the Rehoboth Bastards, which may be regarded as a fifth natural region, has many points of resemblance with the eastern parts of Damara-land. As regards the climate, the three most striking characteristics of the whole region are, the uniform daily range of temperature throughout the year, the great difference in temperature between day and night, and the extreme dryness of the air everywhere in the interior. On the coast the uniformity throughout the year is extraordinary, southerly winds, with dense mist due to the cold coast water, being almost constant. There is hardly any actual rain. In the transition region between the coast and the interior, the mists are sooner dissipated after sunrise, and the day temperatures higher, the difference between those of the day and night increasing with the distance from the coast. Precipitation is very slight, and mostly in the form of thunder-showers. The dryness of the air makes the heat supportable. The whole interior of Southern Damaraland may be classed together with respect to climate, although, of course, minor differences occur. The heat of summer and the cold of winter are moderate throughout. Even in the hottest months (November and December) the evenings are pleasantly cool. In the mountains the winter frosts are not severe, except in the lower parts of shut-in valleys, to which the cooled air sinks. The amount of the rainfall, too, is more favourable than has been supposed, varying from 8 to 12 inches in the exterior parts, and reaching 20 inches, and perhaps more, in the central mountains. The rains begin in October, but cease more or less completely in November and December, the regular rainy season beginning at the end of the latter month, with downpours of thunder-rain, mostly after 2 p.m., which bring about a sharp fall of temperature. From its concentration into a third of the year, the effect of the rain is more favourable to vegetation than if the same amount were evenly distributed. The idea that there are rainless seasons in the interior is, Dr. Dove thinks, mistaken.

German Scientific Work on Mount Kilimanjaro.—During the past eighteen months considerable progress has been made by the Germans in the scientific study of the slopes of Kilimanjaro (*Mitt. aus d. Deutschen Schutzgeb*, 1894, part 1). A station has been founded in the district of Marangu, in the south-east, at an elevation of 5118 feet, to serve as a base of operations, by Drs. Lent and Volkens, the former of whom has devoted his attention to the topography, geology, and meteorology of the district, and the latter to the botany, especially from an economic point of view. The station having been got into working order, and the war with Mosbi and Kilema being concluded, excursions were made into the more elevated parts, a hut being built at a height of 9180 feet. Dr. Volkens also accompanied an expedition into the Vgueno mountains, where he found the cultivated plants of the Chagga states growing side by side with those of the coast, and where he thinks the prospects of tropical cultivation much better than on Kilimanjaro. In his opinion the ideas current as to the value of the forest zone on the latter are much exaggerated. In order to obtain a map sufficiently detailed to serve for his scientific investigations, Dr. Lent has carried out an extensive triangulation, the results of which he has laid down on the large scale of 1 : 25,000. The broad features only of the geology were at first studied, an important point kept in view being the distinction (as affecting the value for cultivation) between soils composed of lavas and tuffs. The plan laid down for the meteorological observations is comprehensive, and should yield valuable results. From a recent number of the *Deutsches Kolonialblatt* (June 1, 1894), we learn that in March last a full year's record was all but completed. Good progress had been made with the topographical surveys, and the botanical collections contained over two thousand species. In December last, while on the road to the military station at Moshi (*id.* June 15), Dr. Volkens inspected the agricultural experiments at the Catholic Mission Station at Kilema, which helped him to form an idea of the prospects of European enterprise in this direction, with reference particularly to the zone between 4260 and 5570 feet, which is, with slight exceptions, the only part hitherto inhabited. At present no paying vegetable product exists. The year is divided sharply into wet and dry periods, with a considerable difference of temperature, in the former of which the intensity of the sun's rays is much diminished by thick clouds, therefore the cultivation of specifically tropical or of subtropical plants requiring much light is precluded. A certain number of possible products remain, some suitable for the support of European colonists, and some which might provide exports. The former, Dr. Volkens thinks, would be assured with a proper choice of the season for sowing and suitable irrigation during the dry season. Below the zone above referred to, a steppe-vegetation of acacias, euphorbias, etc., prevails for the most part, and conditions are nowhere favourable for tropical cultivation.

Count v. Götzen's Expedition in East Africa.—This expedition, the destination of which is Ruanda, had in February last reached the district of Mangati, situated south of Lake Manyara, in the great East African line of depression (*Pet. Mitt.*, 1894, p. 143). The total following of the caravan numbered 600, and so far the route taken differed little from that of Baumann. The two Indian elephants had been left behind from the want of competent persons to look after them. The forward journey was to lead through Usukuma and cut the Tabora-Victoria Nyanza route at right angles. Count v. Götzen had ascended Mount Gurui, as had previously been done by the naturalist Neumann, reaching a point on the summit-ridge only about 330 feet below the top, which, from aneroid and boiling-point thermometer observations taken at the beginning of the ridge, must be about 10,500 feet above the sea. Below the ridge a belt of forest, from one to nearly four miles wide, was crossed, above which the vegetation consists of coarse grass, with Alpine violets, forget-me-nots, and rhododendrons. Tracks of elephant and rhinoceros were seen as far as the highest point reached, whither they retire before the attacks of the elephant-hunters. A large lake was observed in the south-west, which does not appear to have been seen by previous travellers. It was called the Lake of Umburre by one of the party, and was said never to dry up. The traces of volcanic action which have been noticed elsewhere in the neighbourhood of the line of depression, are seen here in the form of craters, which occur around, but apparently not upon, the central mountain. A violent shock of earthquake was also felt in the hilly country of Uassi.

Ascent of Tenerife by Dr. Hans Meyer.—The May number of the *Verhandlungen der Gesellschaft für Erdkunde* contains an extract from a letter from Dr. Hans Meyer, giving some details of a recent visit to Tenerife. On March 11, Dr. Meyer met with fresh snow on the Pico del Pozo in Grand Canary, and four days later he observed at Orotava that snow extended far down on the Cumbre. After exploring the Cañadas—the great plateau (6500 feet) from which the cone of the peak springs—Dr. Meyer ascended the Alto de Chaharra (9900 feet), and crossed the recent volcanic beds between Bilma and Icod. A few days were then spent on Teno and Anaga, and on April 5 the ascent of the peak was begun. Dr. Meyer's was the first ascent of the season, and the success of the undertaking seemed uncertain, as the deep snow had received a fresh covering from thunder-showers a few days before. Snow was first encountered at a height of 6000 feet, but mules were not finally dispensed with till 8200 feet had been reached. The hut at Alta Vista (10,700 feet) was entirely buried in snow, and an entrance to it had to be dug out. Temperature fell to 21° Fahr. during the night; and on the summit being reached at eight next morning, after some stiff climbing on snow and rock, a reading of 27·5° Fahr. was recorded. The wind at the summit blew strongly from north-east—obviously not the antitrade—and the peak itself, owing to its internal heat, was practically clear of snow. The atmosphere was fairly clear, and a good bird's-eye view of the Cañadas was obtained. Descending to Orotava, Dr. Meyer crossed the Pedro Gil Cumbre to Guimar, in order to reach the coast at Santa Cruz. About one hundred and fifty large photographs have been obtained, and numerous measurements of the limits of snow and of vegetation.

Arrangement between France and the Congo Free State.—On August 14, an arrangement was agreed to between France and King Leopold, as sovereign of the Congo Free State, which considerably modifies that referred to in the *Journal* for July, p. 54. A glance at the map on p. 55 will enable the reader to understand what has been done. King Leopold has, in brief, agreed not to occupy the territory leased to him by Great Britain further to the north than 5° 30′ N. lat. In consideration of this, France has agreed to an extension of the northern boundary of the Congo Free State. From the junction of the Mbomu with the Ubangi, the northern boundary follows the *thalweg* of the former river to its source, and thence the water-parting between the basins of the Congo and the Nile to the eastern limit of the State, 30′ E. long. The fact may also be recorded that, in deference to the protest of Germany, England has renounced the lease of the strip of territory within the Congo Free State between Lakes Tanganyika and Albert Edward.

AMERICA.

The Formation of the Bermudas.—The June number of the *American Journal of Science* publishes some notes on the Bermudas from a letter to Professor

J. D. Dana, by Dr. A. Agassiz. Dr. Agassiz spent about a month in examining the Bermudas with the view of completing previous work in the Bahamas, and finds that their story is practically an epitome of the physical changes undergone by the larger group. The relative absence of reef-building corals is, however, a distinctive feature. Dr. Agassiz takes a different view from previous investigators, as to the part which the corals now growing have played in the formation of the reef-ledge flats. He finds that the corals have not added any material part to the reefs; they form only a thin veneer over the disintegrated ledges of æolian rocks, which constitute the so-called reef off the south shore of Bermuda, and the ledge flats of the outer reef-ring near the edge of the Bermuda bank. Æolian rock-ledges underlie the growth of corals, not only on the patches off the south shore and on the ledge flats of the outer reef, but they also underlie the so-called patches and heads forming the flats which extend on both sides of the main channel, and divide the interior waters of the bank into irregular sounds, like Murray anchorage. The passage of the shore æolian rock ledges into the coral patches can easily be traced both off the north and south shores. The islands are formed by the subsidence of an elliptical mass of æolian rock, derived from a recent coral limestone deposit, probably of great extent and some 330 feet in thickness; and the fantastic outlines of the limestone ledges and of the shore rocks below low-water mark are due to the solvent and mechanical action of the sea, modified by the covering coat of gorgonians, millepores, algæ, and corallines, as well as of the more massive corals. In support of his view, Dr. Agassiz discusses in detail the formation of the serpulæ reefs, and adduces evidence to show that all the structures, from a circular or elliptical atoll to a barrier or fringing reef with all their possible modifications, are due to the action of the surf and the wash of the sea in eating away the surface of the mushroom-shaped rocks, which is either softer than the surrounding parts, or is not protected by the covering of ælgæ, corallines, or serpulæ.

POLAR REGIONS.

The Jackson-Harmsworth Arctic Expedition.—The *Windward*, with the Jackson-Harmsworth Expedition on board, left Arkhangel early in August for Franz Josef Land, after having taken on board ponies, wooden houses, and further additions to its already fairly complete equipment. At the Oxford meeting of the British Association, a paper by Mr. A. Montefiore was read, giving a detailed list of the scientific instruments with which the expedition has been supplied. It is evident that every care has been taken to provide for accurate observation in all departments of science, and advantage has been taken of the most recent improvements in the construction of instruments. Many of them have been made of aluminium for the sake of lightness. In the letter from Mr. Markham to Mr. Jackson, which was printed in the *Geographical Journal* for August, p. 177, the penultimate sentence ought to read as follows: "In your hands, for the time, is the Arctic fame of your country, and I feel sure you will rise to the high level of your undertaking," etc.

The Wellman Polar Expedition.—We learn with regret that the progress of the Wellman Expedition has experienced a somewhat severe check. The *Malygen*, a fishing-vessel, arrived at Tromsoe on August 2 with four members of the expedition on board—Captain Bottolfsen and three sailors—who reported that the *Ragnvald Jarl* reached Table Island on May 12, but was compelled by ice to return to Walden Island, in lat. 80° 37′ N., long. 19° 57′ E., which was reached a fortnight later. On May 24 Mr. Wellman started from Walden Island with thirteen men, forty dogs, and provisions for one hundred and ten days, hoping to reach Northern Spitsbergen early in September, and the head-quarters on Dane's

Island in the beginning of October. Up to that time the conditions had been extremely favourable, the health of the party had been excellent, and the weather continuously fine. Four days after Mr. Wellman left the ship was crushed by ice, and only some stores were saved. A message reporting the wreck overtook Mr. Wellman at Martin's Island, and he, with Mr. Dodge and two other members of the party, returned to Walden Island. A house was built with the wreckage of the ship, in which the greater part of the crew was accommodated, and on May 31 Mr. Wellman started to rejoin his party, and, according to news brought to Walden Island by Mr. Winship and a companion, the expedition was temporarily stopped by impassable ice on June 17, six miles to the east of Platen Island. On the return of Mr. Winship, Captain Bottolfsen and four men started southwards across the ice, taking the aluminium boats, and, after a journey of 230 miles, was picked up by the *Malygen* at Rodeleorg on July 24. On August 10, the United States Consular Agent at Tromsoe despatched Captain Bottolfsen in the *Malygen* to Spitzbergen, with a supply of provisions and clothing for the expedition, for which the *Malygen* was to search. Five days after the *Malygen* left, on August 15, Mr. Wellman and the remaining members of his expedition arrived at Tromsoe, all well, in the whaleboat *Berentine*. From the details which have come to hand, it would seem that on May 12, when the expedition had reached a point within a few miles of the 81st parallel, they were obliged to turn east, their further passage north being blocked by ice. Nearly the whole of North-east Land is stated to have been explored, and a number of interesting observations made. The expedition suffered great hardships while crossing Dove Bay, but eventually reached Walden Island, and some distance further south were taken on board by a fishing-vessel, which brought them to Tromsoe. Mr. Wellman intends, it is stated, to lead a second expedition by the Spitzbergen route next summer.

GENERAL.

Death of M. Dutreuil de Rhins.—We regret to learn of the murder in Tibet of M. Dutreuil de Rhins, the well-known French explorer. He had been travelling in Central Asia for about three years. M. Dutreuil de Rhins had in previous years travelled considerably in Africa and in the East, and was an observant explorer and competent geographer.

CORRESPONDENCE.

The Early Cartography of Japan.[*]

It is now nearly six hundred years since the great Venetian traveller Marco Polo startled an incredulous Europe with wondrous tales heard on his travels, of a rich island called Chipangu, lying far out from Asia in the high seas towards the east.

The highest authority on Marco Polo—it should be unnecessary to name the classic work of the late Colonel Sir Henry Yule—accepts Polo's Chipangu as representing the Chinese Jíp-păn-kwó, the kingdom of Japan, and shows that Polo's description consists of actual facts or accepted legends concerning that island.

But, according to an article, entitled "The Early Cartography of Japan," in the May number of this Journal, our accepted ideas are erroneous. "*Marco Polo,*" says the author of this article, "*writing from hearsay, describes, in my opinion, Java, and perhaps other islands contiguous to Java, under the name of Zipangu.*" The famous Fra Mauro is credited with the same interpretation of Marco Polo's intentions, in that he places next to "Giava" an island named "Zimpagu;" but then comes Toscanelli to spoil this harmonious plan by "stealing" the name "from the proper Java, to apply it to a large island south of the equator," while the name Cipango is clapped on to the island thus robbed of its real name.

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[*] See note on p. 270.

"It would be difficult," says the writer, "to find out the exact reason that urged Toscanelli to convert Fra Mauro's Giava into Cipango." It might be difficult indeed, if it had ever occurred.

Apparently Mr. Collingridge, the author of the article in question, has allowed himself to be misled by a superficial similarity between certain maps, coupled with a misunderstanding of Marco Polo, and has placed his convictions before the readers of the *Geographical Journal* in so plausible a fashion that silence is impossible, lest error should spread.

Mr. Collingridge's method of investigation, as laid down by himself, is unimpeachable. "I searched," he says, "on old maps for the origin of the charting of Cipango, and I read up Marco Polo's descriptions carefully." For the first part of his investigation Mr. Collingridge justly considered Fra Mauro's map, completed in A.D. 1459, and Behaim's globe of A.D. 1492, as important documents. The former is at Venice, the latter at Nuremberg; but fortunately there are several reproductions of each in existence. For instance, among the best reproductions of Fra Mauro there is a large and on the whole faithful copy in the British Museum, there is a representation in a series of sections in Santarem's great atlas, and there are photographs, which unfortunately are in parts almost too dark to be legible, but from which a careful reproduction by Professor H. Kiepert has been made, giving those names which are distinctly legible.

Similarly of Behaim's globe there are many copies in the various great atlases of early maps, but notably in such special works as those by Doppelmayr and Ghillany, which deal with the designer of that famous globe.

There is a third document which would be valuable if we had it, namely, Toscanelli's celebrated map, but that unfortunately is lost. Some details given in a letter by Toscanelli have, however, led geographers to conjecture that it must have partly formed the basis of Behaim's globe. Mr. Collingridge goes a step further in saying "we *know* it to be similar" to that globe, and this statement makes it the more surprising that, for the purpose of comparison in the sketch on p. 405, Behaim's authentic globe is not used, but an attempted restoration of the lost map of Toscanelli.

I do not know how far Mr. Collingridge desires to assume responsibility for this sketch by signing his name to it, but it is certainly a rough reproduction of an attempted restoration of the lost map, which was originally published some years ago in "Ausland," and has been copied with tedious iteration into almost every book or atlas dealing with the period of Columbus.

It is unnecessary here to enter into a discussion of the remarkable projection employed. I need only say that it bears internal evidence, to which Professor Wagner of Göttingen first drew my attention—for instance, the extraordinary hammer-headed peninsula at the eastern extremity of Asia, which is not to be found on Behaim's globe—of having been apparently constructed from the very indifferent sketch of that globe given in Lelewel's atlas.

When placed, as on p. 405, side by side with a greatly reduced sketch of a portion of Fra Mauro's map, an apparent resemblance is produced, which at first sight is distinctly misleading. A closer examination, however, will show that in reality this resemblance is purely superficial.

In this connexion it is, I hope, not carping criticism to protest against a certain additional similarity between the two sketches which is produced by the insertion on each of a few names, like India, Mangi, Ciampa and Zaiton, in similar types and at similar angles, which are not thus to be found on the originals—though, indeed, no great knowledge is required to perceive that neither Fra Mauro nor Toscanelli would have committed the error of inserting the name of Zaiton, the port, as if it were that of a province.

But I feel sure Mr. Collingridge would admit that no scientific purpose can be served by using *a rough sketch of a hypothetical restoration of a lost map reconstructed from an indifferent drawing of a globe*, when that globe exists and is accessible; and yet this is what has been done on p. 405. It is like quoting an author by an abridged version of a translation made from an indifferent text.

Even if the better drawing of Fra Mauro's Giava on p. 407 be compared with the "Cipango" in this Toscanelli sketch, the resemblance will be seen to be slight; but if the comparison be made with one of the careful reproductions of the original Behaim's globe, to which I have referred, the similarity will be found to be still slighter.

In fact, Behaim's Cipango, far from being "almost a tracing of Fra Mauro's Giava," resemble it only in so far as that they are both somewhat rectangular, longer than broad, and placed vertically—characteristics common to other doubtful islands in fifteenth-century maps, *e.g.* Antillia, Saluaga.

With regard to the sketch on p. 407, which seems to be taken from Santarem's atlas, though it is rather startling to find in the heart of it, at the end of a long inscription beginning "Giava mazor isola noblissima," the words "Geo. Collingridge del. 93," there is certainly a superficial resemblance to Java and some of its adjacent islands; but this again is misleading, and, it must be said, much less marked in Kiepert's reproduction of Fra Mauro. It is really only due to the fact that there is a short string of small islands to the east of Java, while Fra Mauro shows Java as a large island in the middle of a string of smaller ones stretching halfway round the world. Mr. Collingridge's statement that Fra Mauro "must have drawn these East Indian islands from a portolano, for they bear, especially Java, the characteristic correct features of those documents," rests on no other basis than his own assertion. It would indeed be remarkable if Fra Mauro had had accurate information of these few islands, when it is only too evident that his knowledge of their situation and surroundings, as, in fact, of nearly the whole of Asia, both continental and insular, was of the very vaguest description. Mr. Collingridge adopted a second line of investigation—"I read up Marco Polo's descriptions carefully," he says.

It is difficult to believe that any one could nowadays set himself to write seriously about Marco Polo without consulting Colonel Yule's edition, but had Mr. Collingridge done so, it is improbable that he would have made such statements as that "the descriptions of the extraordinary richness of the sovereign's palace," etc., "have always referred to Java," or that "the great Khan Kublai may have sent military expeditions to Japan; we know for certain that he sent several to Java;" for in the edition referred to, authorities are quoted to show that the former agree with Chinese traditions about Japan, and as regards the latter point, the dates are given of more than half a dozen expeditions sent by Kublai against Japan between A.D. 1266 and A.D. 1281, together with a long extract from the Japanese Annals translated by Titsing, referring to a Mongol expedition, which agrees with that described by Marco Polo, even down to the names of the generals in command.

It is, however, not merely Marco Polo's editor, but that grave writer himself, who fails to receive the careful consideration which is his due. According to Mr. Collingridge, "Marco Polo says that the island of Zipangu is 1500 miles from China," and "gives precisely the same distance to Java." What Marco Polo actually says is, "You must know that on leaving the port of Zayton you sail west-south-west 1500 miles, and then you come to a country called Chamba" (Cochin China); and in the following chapter, "when you sail from Chamba 1500 miles in a course between south and south-east, you come to a great island called Java," which altogether gives the position of Java as 3000 miles in a southerly direction from the port of Zayton, in China, while "Chipangu is an island towards the east in the high seas 1500 miles distant from the continent." Mr. Collingridge seems to have skipped a chapter in his reading of Marco Polo.

It is, however, a description of the monsoon navigation which he finds "conclusive." It is only necessary to point out that this description occurs after Marco Polo has finished with Chipangu, exclaiming, "But now we will have done with that island, and speak of something else."

These inaccuracies with regard to Marco Polo are so obvious that reference to Mr. Collingridge's article would have been needless had he not appealed to cartography, and illustrated his paper by sketches which are likely to mislead.

There is a double danger with regard to early maps, which demands great discretion in their use. Comparative cartography is a most valuable adjunct to the scientific investigator, but in unskilled hands is like a keen-edged tool, not only dangerous to the user, but apt to suffer injury itself.

Mr. Collingridge's concluding paragraph contains an essay in etymology which can scarcely be meant to be taken seriously. Without dwelling on the decided improbability, from known facts, of Sumbawa ever having been heard of until more than fifty years after Fra Mauro's time, or on the question of the correct reading of the name on Fra Mauro's map ("Zimpagu" is not that adopted by Kiepert, but Zimpangu), one can only express profound astonishment at the effort to identify Cipango with Sumbawa by the method of a "more homogeneous choice"! It was to have been hoped that this "method" had long since perished of well-deserved ridicule.

H. Yule Oldham.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By **HUGH ROBERT MILL, D.Sc.,** *Librarian*, **R.G.S.**

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria—Vienna. *M.G. Ges. Wien* 37 (1894): 384–405. **Umlauft.**

Die Wiener-Neustädter Canal. Von Professor Dr. Friedrich Umlauft.

This canal will be referred to in the Monthly Record. It forms the first part of a projected line of canal-communication between Vienna and the Adriatic.

Continental Handbook. **Tiedeman.**

The Continent by Queenboro' viâ Flushing a comprehensive and unconventional Handbook for English and American tourists abroad. By H. Tiedeman. *With seven Maps and numerous Illustrations.* London, Iliffe & Son, 1894. Size 7½ × 5, pp. xvi., xliv., and 566. *Price* 3*s. net. Presented by the Publishers.*

Contains brief descriptions of a number of places of interest on the Continent, with a few preliminary hints for tourists.

England—Oxfordshire. **Murray.**

Handbook for Travellers in Oxfordshire. *With Maps and Plans.* London, John Murray, 1894. Size 7 × 5, pp. vi. [14] and 242. *Price* 6*s.*

It should be noted that the Handbook for Oxfordshire now occupies a volume by itself. The present edition has been carefully revised, and contains a good map of the county with the main roads coloured, and also a clearly executed plan, in two sections, of the city of Oxford.

France—Rhone. *B.S.G. Paris* **15** (1894): 70–134. **Bourdon.**

Le Cañon du Rhone et le lac de Genève. Par G. Bourdon.

Germany—Riesengebirge. **Partsch.**

Die Vergletscherung des Riesengebirges zur Eiszeit. Nach eigenen Untersuchungen dargestellt von Dr. Joseph Partsch (Kirchoff's Forschungen zur deutschen Landes- und Volks-kunde. Achter Band. Heft 2). Stuttgart, J. Engelhorn, 1894. Size 9½ × 6½, pp. 98. *Price* 6 *marks.*

This memoir is illustrated by maps, sections, and a series of photographic views.

Great Britain. **Ramsay.**

The Physical Geology and Geography of Great Britain: a Manual of British Geology. By the late Sir Andrew C. Ramsay. Sixth Edition. Edited by Horace B. Woodward. London, Edward Stanford, 1894. Size 8½ × 6, pp. xv. and 421. *Maps and Illustrations. Price* 10*s.* 6*d. Presented by the Publisher.*

We are glad to welcome this classic of physical geography in its new form, which should give it a fresh lease of life and usefulness. The revision and extension of the original has been done wisely and sympathetically, although in some cases less completely than might be advisable. This is particularly the case in the section on the origin of lakes, which might well have been supplemented by a note referring to recent advances both in observation and theory. The geological map is utterly inadequate, and a selection of reproductions of photographs of typical scenery would enormously increase the value of the book.

Holland—Dunes. **Lorié.**

Tijdschr. Nederlandsch Aardrijksk. Genoots. **10** (1893): 753–796, 939–980.

Binnenduinen en Bodembewegingen, door Dr. J. Lorié.

A description of the sand-dunes along the coast of Holland given in great detail, the different sections of the coast being separately treated, and the general character of the whole subsequently generalized. A map of the dune-covered districts is given, and a series of diagrams.

Iceland. *Quarterly R.* **179** (1894): 58–82. ———

Iceland To-day.

Italy—Appenines. *Rev. G. Italiana* **1** (1894): 429–438. **Roggero.**

Il collo di "Bocca Trabaria" come limite tra l'Appennino Settentrionale e l'Appennino Centrale per il cap. G. Roggero.

The paper is illustrated by a diagrammatic map showing the line of division which the author claims to be the natural separation between the northern and central divisions of the Appenines. It runs from Arezzo across the pass known as Bocca Trabaria, and follows the river Metauro from its source to the Adriatic Sea at Fano.

Lipari Islands. **Ludwig Salvator.**

Die Liparischen Inseln. Drittes Heft. Lipari. Prag, H. Mercy, 1894. Size 16½ × 13, pp. xvi. and 158. *Maps and Illustrations. Presented by the Archduke Ludwig Salvator.*

This is the continuation of the most sumptuously printed and illustrated geographical memoir recently published.

Scotland—West Highlands. ——

Mountain, Moor, and Loch, illustrated by Pen and Pencil, on the route of the West Highland Railway. London, Sir Joseph Causton & Sons, 1894. Size 9 × 6, pp. 180. *Illustrations. Presented by the Manager of the North British Railway.*

A finely illustrated official guide to the West Highland Railway, which opened for traffic in August last. The line runs from Helensburgh along the east side of the Gareloch and Loch Long to Arrochar, thence by the west side of Loch Lomond up Glenfalloch, crossing the Callander and Oban line, and across the Moor of Rannoch between Loch Rannoch and Loch Lydoch, thence by Loch Treig and down Glen Spean to Fort William.

Spain and its Colonies—Dictionary. **Castillo.**

Gran Diccionario geográfico, estadistico é histórico de España y sus Provincias de Cuba, Puerto Rico, Filipinas y posesiones de Africa. . . . Esta obra se publica bajo la dirección de D. Rafael del Castillo con la colaboración de notables escritores y artistas. Tomo IV. [T—Z]. Barcelona, Henrich & Co., 1892. Size 13 × 9, pp. 546. *Map. Price* 22*s.* 6*d.*

This volume carries the Gazetteer of Spain and its Colonies from Tabaco to Zuya, completing the work. It concludes with a list of about 15,000 names alphabetically arranged, and a large map of Spain containing a good deal of unusual information.

ASIA.

India—Geology. **Oldham.**

A Manual of the Geology of India. Chiefly compiled from the observations of the Geological Survey. Stratigraphical and Structural Geology. Second Edition, revised and largely rewritten by R. D. Oldham. Calcutta; London, Trübner & Co., 1893. Size 10½ × 7½, pp. xxiii. and 543. *Maps and Plates. Price* 16*s. Presented by the Geological Survey of India.*

Mr. Oldham's recent paper in the *Journal* on the geological history of India afforded our readers an opportunity of judging of his fitness to bring this manual abreast of the results of current science; he has succeeded in making his descriptions readable as well as authoritative.

Indian Ocean. **Venukoff.**

The Indian Ocean. By M. Venukoff. [In Russian.] Size 10 × 6½, pp. 20. *Presented by the Author.*

Malay Archipelago—Celebes—Baree Language. **Kruyt.**

Woordenlijst van de Bareë-Taal, gesproken door de Alfoeren van Centraal Celebes beoosten de rivier van Poso, beneveno de Topebato-Alfoeren bewesten genoemde rivier. Door Alb. C. Kruyt. Uitgegeven door het koninklijk Instituut voor de Taal-, Land-, en Volkenkunde van Nederlandsch-Indië. The Hague, Martinus Nijhoff, 1894. Size 10 × 6½, pp. 122.

Malay Archipelago—Ceram. **Boot.**

Tijdschr. Nederlandsch Aardrijksk. Genoots. 10 (1893): 650-678, 885-902, 1163-1204.
Korte Schets der Noord-Kust van Ceram. Door J. Boot.

This is a posthumous work of the late military governor of the Wahai division. The name of the author is given erroneously in the first two parts as W. G. Boot.

Malay Archipelago—Sumatra. **Dijk.**

Tijdschr. Nederlandsch Aardrijksk. Genoots. 10 (1893): 1076-1091.

Rapport omtrent het onderzoek naar de mogelijkheid en wenschelijkheid om eenen voor voertuigen geschikten de Uitwataing van het Toba-meer en het in de residentie Sumatra's oostkust gelegen Bandar Poelo. Door P. A. L. E. van Dijk. *With Map.*

Philippines—Magnetic conditions. **Cirera.**

El Magnetismo Terrestre en Filipinas por el P. Ricardo Cirera. Manila, 1893. Size 12½ × 9, pp. 158.

This is a very important contribution to our knowledge of the distribution of terrestrial magnetism. It gives a full account of the instruments and methods employed at the Manila Observatory, and is furnished with a series of maps showing the magnetic conditions, as well as with a great number of diagrams.

Shan Names. ———

Tables for the Transliteration of Shan Names into English. Rangoon, 1892. Size 9½ × 6½, pp. 12.

Siberia—Yakuts district. **Maydell.**

Reisen und Forschungen im Jakutskischen Gebiet Ostsibiriens in den Jahren 1861-1871, von Baron Gerhard Maydell. Erster Theil (Band I. Vierte Folge Beiträge zur Kenntniss des Russischen Reiches und der angrenzenden Länder Asiens . . . herausgegeben von L. v. Schrenck und Fr. Schmidt) St. Petersburg, Kaiserlich Akademie der Wissenschaften, 1893. Size 10 × 7, pp. xx. and 708. *Price* 19*s*. *Presented by the Imperial Academy of Sciences, St. Petersburg.*

Baron Gerhard Maydell has spent twenty-four years in Siberia studying the country, and this volume gives the first part of his account of the results of ten years spent in the Yakuts country in the extreme north-east of Asia. It is planned in the form of a narrative of travel, and each important stage of his journey forms a chapter.

AFRICA.

Algeria and Tunis. *Nouvelles Archives Missions Scientifiques* 4 (1893): 285-434. **Diehl.**

Rapport sur deux missions archéologiques dans l'Afrique du Nord (Avril–Juin, 1892, et Mars-Mais, 1893). Par M. Diehl, professeur à la Faculté des Lettres de Nancy.

A study of the archæology of Algeria and Tunis, particularly of the Byzantine ruins. The memoir is illustrated by numerous photographs.

British Central Africa—Shire. *Petermanns M.* 40 (1894): 165–166. **Merensky.**

Der Shire-Fluss. Von Missionssuperintendent, Dr. A. Merensky. *With Map.*

Cape Colony—Transkei. *T. South African Philos. S.* 8 (1890-92): 1–11. **Schunke.**

The Transkeian Territories, their Physical Geography and Ethnology. By H. C. Schunke.

This is an attempt to give a succinct account of the geography of "Kaffraria proper," which lies in the extreme south-east of Africa, bordering Natal.

Congo State. **Bailey.**

Travel and Adventures in the Congo Free State and its Big Game Shooting. By Bula N'Zau [Henry Bailey]. Illustrated from the Author's sketches. London, Chapman and Hall, Ltd., 1894. Size 9½ × 6, pp. xviii. and 336. *Price* 14*s*. *Presented by the Publishers.*

This book is confined to a record of the sport obtained by the author during the four years of his service in the Congo State. There is a route map, and there are several sketches of hunting adventures.

East Africa. *Sitzb. k. preussischen. A. W. Berlin* (1894): 3–21. **Dillmann.**

Ueber die geschichtlichen Ergebnisse der Th. Bent'schen Reisen in Ostafrica. Von A. Dillmann.

A piece of historical research into the origin of the builders of Zimbabwe and other ancient African structures.

French West Africa. **Laumann.**

A la Côte occidentale d'Afrique. Par E.-M. Laumann. Préface de Jean Bayol. Paris, Firmin-Didot & Co., 1894. Size 8 × 5½, pp. vii. and 266. *Maps and Illustrations.* *Price* 3 *fr.* 50 *c.*

A popular account of a visit to Konakry and to the Susu country.

French West Africa. *Ann. G.* 3 (1894): 409–427. **Monnier.**

Une Jeune Colonie. Côte d'Ivoire et Soudan meridionale. Par M. Marcel Monnier. *Illustrations.*

Madagascar. *Ann. G.* 3 (1894): 499–517. **Gautier.**

Mission Emile Gautier à Madagascar. Par Emile Gautier.

The work here described was done in the region between 18° and 21° S. lat. and between 43° and 47° W. long. This included the entirely new itineraries from Ambiky to Ankavandra-Ambohitsalika, and from Manandaza to Mahabo.

South Africa. *T. South African Philos. S.* 8 (1890–92): 12–15. **Schunke.**

Notes on the Orography and Climatic condition of South-Eastern Africa, and on the migration of natives. By H. C. Schunke.

The historical facts as to the power of South African natives to become acclimatized to unhealthy regions suggest "the question of reserving the large tracts of comparatively unhealthy but exceedingly fertile country north of the Limpopo for our Cape and Natal natives. . . . The removal will not take place to-day, but it is well to think of such a question in good time."

South Africa. *T. South African Philos. S.* 8 (1890–92): 16–22. **Liebman.**

Mashonaland and Matabeleland. Facts and Figures. A reply to Mr. Schunke.

A caustic criticism of Mr. Schunke's paper on the orography and climatic conditions of South-Eastern Africa noted above.

South-West Coast. *T. South African Philos. S.* 5 (1886–88): 326–329. **Wilmer.**

The relation of the sand-dune formation on the south-west coast of Africa to the local wind currents. By H. Carrington Wilmer.

NORTH AMERICA.

United States—Carolina. **Hughson.**

Johns Hopkin's University Studies. Twelfth Series. V., VI., VII. The Carolina Pirates and Colonial Commerce, 1670–1740. By Shirley Carter Hughson. Baltimore, 1894. Size 9½ × 6, pp. 134.

A history of the doings of the pirates of the coasts of the two Carolinas during the seventeenth and eighteenth centuries.

United States—Maryland. ———

U.S. Department of Agriculture, Weather Bureau. The Climatology and Physical Features of Maryland. First Biennial Report of the Maryland State Weather Service for the years 1892 and 1893. Baltimore, 1894. Size 10 × 7, pp. 140. *Maps and Plate.*

United States—North Carolina. **Pinchot.**

Biltmore Forest, the property of Mr. George W. Vanderbilt. An account of its treatment, and the results of the First Year's Work. By Gifford Pinchot. Chicago, 1893. Size 5½ × 8, pp. 49. *Map and Illustrations.*

The Biltmore Estate, of which the Biltmore Forest constitutes a little over one-half, is situated in the western part of North Carolina, on the right and left banks of the French Broad River, in latitude 35° 33′ N., longitude 82° 33′ W.

United States—Oregon—Tacoma. *Sierra Club B.* 1 (1894): 109–132. **Trump.**

Mount Tahoma. A narrative of an ascent of the mountain by its western slope, being an exploration of Crater Peak and North Peak. By P. B. Van Trump. *With Illustrations.*

United States—Pennsylvania. *P. American Philos. S.* 33 (1894): 114–134. **Rothrock.**

Forests of Pennsylvania. By J. T. Rothrock.

This paper treats of the kinds of timber trees in Pennsylvania, the most important forest areas of the State, the configuration of Pennsylvania in relation to the growth of timber, rates of growth of timber trees, and obstacles to growth both natural and due to human agencies. It concludes with an account of the attitude of the State with regard to forest restoration, and a discussion of the methods of forest restorations.

United States—Rivers, etc. ———

Annual Report of the Chief of Engineers, United States Army, to the Secretary of War, for the year 1893. 6 Parts. Washington, 1893. Size 9 × 6, pp. 4404. *Maps and Plates. Presented by the Engineer Department, U.S. Army.*

Contains full details of the operations of the U.S. Engineer Department for the fiscal year ending June 30, 1893, with the Reports of the Mississippi and Missouri River Commissions.

CENTRAL AND SOUTH AMERICA.

Andes. *Globus* 65 (1894): 324–326. **Martin.**

Neue Beobachtungen in den patagonischen Anden. Von Dr. Karl Martin.

Argentine and Chile. *M.G. Ges. Wien* **37** (1894): 225–263. **Polakowsky.**
Die Entwickelung von Argentinien und Chile in den Jahren, 1889–1893. Von Dr. H. Polakowsky.

An account of recent progress in the two southern republics of South America with regard to exploration and to the economic development of the countries.

Bolivia. *Scottish G. Mag.* **10** (1894): 302–312, 360–371. **Urquhart.**
The Bolivian Altiplanicie. By D. R. Urquhart.

Brazil—Minas Geraes. **Lacerda.**
Organisação e Trabalhos de Commissão Geographica e Geologica do Estado de Minas Geraes por Augusto de Abreu Lacerda, Engenheiro Chefe. *Commissão Geographica e Geologica do Estado de Minas Geraes. Boletim* No. 1. Size 10 × 6½, pp. 70. Rio de Janeiro, 1894.

Brazil—Rio Grande do Sul. **Ihering.**
Deutsche Rundschau G. **16** (1894): 337–348, 403–409, 459–464.
Aus meinem Leben und über meine Thätigkeit in Rio Grande do Sul. Von Dr. Hermann von Ihering in São Paulo. *With Portrait.*

Dr. Ihering's work lay mainly in the study of the fauna of the state of Rio Grande do Sul, and his autobiographical article is terminated by a list of his published writings.

Colombia—Ruins. **Cuervo Marquez.**
Carlos Cuervo Marquez, Prehistoria y Viajes. Tierradentro, Los Paeces, San Agustin, El Llano, etc., etc. 1893. Bogotá (Colombia). Size 9½ × 6½, pp. 248. *Illustrations. Presented by the Author.*

An archæological journal of a tour through parts of Colombia, with notes on native customs and beliefs.

Ecuador—Cayapas. *Tour du Monde* **67** (1894): 401–416. **Basurco.**
Trois semaines chez les Indiens Cayapas (République de l'Ecuador). Par M. Santiago M. Basurco, Ingénieur civil.

M. Basurco's journey to the Cayapas river took place in 1891–92. This account of it is illustrated with some highly characteristic groups of natives.

Peru—Chucuito. *B.S.G. Lima* **3** (1894): 365–373. **Basadre.**
Puno. Provincia de Chucuito, por D. Modesto Basadre.

AUSTRALASIA.

Australia—Railways. **Kandt.**
Ueber die Entwickelung der Australischen Eisenbahnpolitik nebst einer Einleitung über das Problem der Eisenbahnpolitik in Theorie und Praxis. Von Dr. Moritz Kandt. Berlin, H. Mamroth, 1894. Size 9 × 6, pp. xxxiv. and 263.

An essay on the Australian railway policy, including an historical account of the origin of the government railways of Victoria, and the history of the railway system in that colony.

New Guinea. **Macgregor.**
Despatch from His Honour the Administrator of British New Guinea, reporting the proceedings in connection with the Delimitation of the Boundary between British and Dutch New Guinea, 1893. Size 13½ × 8½. *Maps. Presented by the Secretary of State for the Colonies.*

The two maps accompanying this despatch show: Map No. 1, the position of the present and of the proposed boundary; Map No. 2, the coast-line of the district immediately adjoining the Bensbach, and the course of that river, ascended by Sir William Macgregor some ten miles. See this *Journal*, vol. ii. p. 270.

New Guinea—Humboldt Bay. *Rev. G.* **34** (1894): 410–416. **Estrey.**
La baie de Humboldt (Nouvelle Guinée). Par H. Meyners D'Estrey.

An account of the explorations carried out by M. Bink, for the Dutch Geographical Society, in New Guinea. He lived for three months on the shore of Humboldt Bay, examining the surrounding country and studying the people. A sketch-map is given showing Humboldt Bay and the Santani lake which lies inland from it.

New South Wales. *J. S. Arts* 42 (1894): 666-676. **Inglis.**
The Industries and prospective sources of wealth in New South Wales. By the Hon. J. Inglis. With Discussion.

North Australia and New Guinea. *Verh. Ges. Erdk. Berlin* 21 (1894): 272-289. **Semon.**
Reisen in Nord-Australien und Neu Guinea. Von Prof. Dr. Richard Semon.

Torres Strait. *T. R. Irish A.* 30 (1894): 419-476. **Haddon, etc.**
On the Geology of Torres Straits. By Professors A. C. Haddon, W. J. Sollas, and G. A. J. Cole. *Plates.*

The paper includes a general account of the physical features of Torres Straits and of its volcanic and coral islands. It will be referred to elsewhere in the *Journal.*

POLAR REGIONS.

Antarctic—Animal Life. **Bruce.**
Animal Life observed during a Voyage to Antarctic Seas. By W. S. Bruce, Naturalist to the s.s. *Balæna.* [Reprinted, May 9, 1894, from the *Proceedings* of the Royal Physical Society of Edinburgh, vol. xii.] Size 8½ × 5½. *Presented by the Author.*

Kara Sea. **Peel.**
Polar Gleams: an Account of a Voyage on the yacht *Blencathra.* By Helen Peel. With a Preface by the Marquess of Dufferin and Ava, and contributions by Captain Joseph Wiggins and Frederick G. Jackson. London, Edward Arnold, 1894. Size 9 × 6, pp. xvii. and 211. *Map, Portrait, and Illustrations. Price* 15*s. Presented by the Publisher.*

A pleasantly written little book, giving a lively picture of the first yacht voyage through the Kara Sea. The author and her hostess were the first ladies who have traversed the future sea-route to Siberia, and she has given a most creditable account of her experiences.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Astronomy. *J. Manchester G.S.* (1892): 211-225. **Weir.**
Astronomy in Relation to Geography. By Mr. Thomas Weir.

Atmosphere. **Langley.**
Smithsonian Contributions to Knowledge, 1884. The Internal Work of the Wind. By S. P. Langley. Washington, 1893. Size 13½ × 10, pp. 23. *Plates.*

This memoir shows that wind is not a uniformly moving mass of air, but consists of successive brief pulsations giving a potentiality of "internal work" by means of which not only may many of the phenomena of a soaring bird be explained, but suitably constructed flying-machines might be sustained and propelled through the air.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

Brighton. **Bartholomew.**
Plan of Brighton from the Ordnance Survey. Scale 4·7 inches to a mile. W. H. Smith & Son's series of Reduced Ordnance Maps for Tourists. By J. Bartholomew, F.R.G.S. London, W. H. Smith & Son. *Price* 1*s., mounted on cloth. Presented by Messrs. J. Bartholomew & Co.*

This map belongs to Bartholomew's reduced Ordnance Survey series; it is very clearly drawn, and the heights above sea-level are given. It is accompanied by an index, by the aid of which any street can be readily found.

Germany. **Königl. Preuss. Landes-Aufnahme.**
Karte des Deutschen Reiches. Scale 1: 100,000 or 1·7 stat. miles to an inch. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1894. Sheets:—45, Lanenburg in Pom; 123, greifenberg i. Pom; 124, Schivelbein; 125, Polzin; 220, Arnswalde; 300, Buk; 644, Freiburg i. Breisgau. *Price* 1·50 *marks each sheet.*

Scotland. **Bartholomew.**

Bartholomew's Reduced Ordnance Survey of Scotland. Scale 1 : 126,720 or 2 stat. miles to an inch. New Series. Sheet 16. Braemar and Blair Atholl. J. Bartholomew & Co., Edinburgh, 1894. *Price 2s., mounted on cloth. Presented by the Publishers.*

This map is a reduction from the Ordnance Survey; it is contoured and orographically coloured. All means of communication are very clearly shown. Main driving roads are coloured brown; other roads are shown by double lines, and railroads by a thick black line; footpaths, bridle roads, and parish boundaries are also indicated.

Scotland. **Collins.**

Twelve Charts of the Tidal Streams on the West Coast of Scotland, by F. Howard Collins. London, J. D. Potter, 1894. *Price 5s. Presented by the Author.*

This atlas contains twelve charts of the west coast of Scotland, on which the directions of the tidal streams from Cape Wrath to Wigton Bay at all hours of the tide, and upon any day of the year, are shown by arrows, which have been placed in accordance with the information contained in the Admiralty Sailing Directions, the Tide Tables for the British and Irish Ports, 1894, and Archibald Smith's paper in the *Proceedings* of the Royal Society, "On the Tidal Currents on the West Coast of Scotland." Full directions are given at the beginning of the atlas for the manner in which the charts can be used.

AFRICA.

British South Africa. **Stanford.**

Stanford's Map of British South Africa. Scale 1: 5,977,382 or 94·3 stat. miles to an inch. E. Stanford, London, 1894. *Presented by the Publisher.*

In this map all the political divisions are shown, and the railways have been brought up to date. The heights are given in feet. It is clearly drawn, and is a useful map for general reference.

Upper Congo Region. **Cornet.**

Geognostische Übersicht des Südlichen Teiles des Kongo-Gebietes. Nach eigenen Aufnahmen gezeichnet von Dr. J. Cornet. Scale 1 : 2,000,000 or 31·4 stat. miles to an inch. 'Petermanns Geographische Mitteilungen,' Jahrgangang, 1894, Tafel 10. Justus Perthes, Gotha.

West Africa. **Geographical Society of Berlin.**

Übersicht der Reisewege der deutschen Kamerun-Expedition, 1893–1894. Scale 1: 3,000,000 or 47·3 stat. miles to an inch. Gesellschaft für Erdkunde zu Berlin. Sitzung vom 7, Juli, 1894. *Presented by the Geographical Society of Berlin.*

AMERICA.

Argentine Republic. **Museo de La Plata.**

Mapa de la Provincia de Catamarca, construido segun datos recogidos y observaciones perdonales hechas en los años 1887–93 por Gunardo Lange, Ingeniero, director de la Seccion Topográfica del Museo, y dibujado por Enrique Delachaux, Cartógrafo, director de la Seccion Cartográfica del mismo Establecimiento, 1893. Scale 1 : 500,000 or 7·8 stat. miles to an inch. Museo de La Plata. 4 sheets. *Presented by the Directors of the Museum of La Plata.*

This map has been compiled from the latest official documents and surveys. The importance of each town is indicated by the symbol employed to mark its position, all railways in operation, as well as those which are projected, are laid down, and the positions of springs, marshes, and mines are indicated. Care has been taken to lay down all boundaries accurately, and a note is given in which mention is made of all the authorities consulted in the construction of the map. An inset of the northern part of Catamarca is given on a smaller scale.

United States. **Rand, McNally & Co.**

Rand, McNally & Co.'s Indexed County and Railroad Pocket Map and Shippers' Guide of New York (scale 1 : 840,000 or 13·2 stat. miles to an inch) and Pennsylvania (scale 1 : 765,000 or 12·1 stat. miles to an inch). Rand, McNally & Co., Chicago and New York, 1894. *Presented by the Publishers through E. Stanford, Esq.*

Stanford.

Stanford's General Map of the United States. Scale 1 : 5,274,720 or 83·25 stat. miles to an inch. E. Stanford, London, 1894. *Presented by the Publisher.*

GENERAL.

World. **Herrich.**

Weltverkehrskarte. Entworfen von A. Herrich. Carl Flemming's Generalkarten No. 51. Äquatorial-Massstat 1 : 50,000,000 or 11½ degrees to an inch. Druck und verlag von Carl Flemming in Glogau. *Price mark* 1·50.

Historical Geography. **Schrader.**

Atlas de Géographie Historique. Ouvrage contenant 54 grandes Cartes doubles en couleurs, accompagnées d'un Texte Historique au dos et d'un grand nombre de Cartes de Détail, Figures, Diagrammes, etc. Par une Réunion de Professeurs et de Savants sous la direction Géographique de F. Schrader, directeur des travaux cartographiques de la librairie Hachette et C^ie^. Paris, Hachette et C^ie^, 1894. Livraison. *Price* 1*fr.* 50*c.* *Presented by the Publishers.*

Sheet 10 contains maps of the Roman possessions in 146 B.C. and 30 B.C., the Roman World and the Barbarian World at the time of the Cimbrian invasion, and the Orient at the time of Mithridates. Sheet 22 is a map showing the partition of Germany and the progress of France, with three insets of France in 1515, 1610, and 1659. Sheet 41 is a map of Central and Western Germany in 1798, with insets of the ecclesiastical principalities in 1789, and the free-cities 1789. As usual with this atlas, each map is accompanied by well-written historical notes.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published at the Hydrographic Department, Admiralty, May and June, 1894. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
1464	m = 2·95	England, west coast:—Menai Strait. 2*s.* 6*d.*
2303	m = 1·4	Norway, west coast:—Approaches to Bergen. 2*s.* 6*d.*
2061	m = 1·73	White sea:—Approaches to Kem. 1*s.*
1770	m = 4·2	Black sea:—Port of Liban. 1*s.* 6*d.*
1774	m = 0·5	Spain, south-east coast:—Adra to Cartagena. 2*s.* 6*d.*
1804	m = 0·5	France and Spain, south coast:—Cape St. Sebastian to Cette. 3*s.*
367	m = 7·2	France, south coast:—Port of Cette. 1*s.* 6*d.*
2021	m = 6·0	Greece, entrances to Corinth Canal:—Corinth roads, Kalamaki Bay. 1*s.* 6*d.*
1910	m = 0·25	Mediterranean, Algeria:—Algier to Cape Bongaroni. 2*s.* 6*d.*
1909	m = 0·25	Mediterranean, Algeria:—Cape Ivi to Algier. 2*s.* 6*d.*
867	m = 3·97	Bermuda Islands:—The Narrows to Hamilton. 3*s.*
2141	m = 1·0	Newfoundland, south-west coast:—Indian Harbour to Cape Ray. 3*s.*
2464	m = 0·5	Madagascar, west coast:—Nosi Andrianmitarika (Crab Island), to Manānonoka Point (Black Point). 2*s.* 6*d.*
855	m = various.	Sumatra, west coast:—Banjak Islands and adjacent coast of Sumatra, Tapanuli Bay, and Pulo Mansalar, Tapanuli harbour, Tapus Road. 1*s.* 6*d.*
380	m = 5·96	China, Hong Kong:—Taitam Bay. 1*s.* 6*d.*
383	m = 6·0	Australia, north coast:—Thursday Island harbour. 1*s.* 6*d.*
2919	m = 0·5	Australia, east coast:—Cape Grenville to Cape York. 2*s.* 6*d.*
1301		Plans on the Coast of Chile:—Plan added, Blanco Encalada.
1454		Anchorages in Alaska:—New Plan, Chernoffski harbour.

J. D. Potter, agent.

Charts Cancelled.

No.		Cancelled by	No.
1464	Menai Strait.	New Chart. Menai Strait.	1464

No.	Cancelled by	No.
2304 Plan of approaches to Bergen on this sheet.	New Chart. Approaches to Bergen.	2303
2605 Plan of port of Cette on this sheet.	New Plan. Port of Cette.	367
2603 Palamos to Cape Béarn.	New Plan. Cape St. Sebastian to Cette.	1804
867 The Narrows to Ireland Island.	New Plan. The Narrows to Hamilton.	867
693 The western coast of Madagascar, from Murderers' Bay to Cape St. Vincent.	New Chart. Nosi Andrianmitarika (Crab Island), to Mananonoka Point (Black Point)	2464
855 Anchorages on the west coast of Sumatra.	New Plans. Anchorages on the west coast of Sumatra.	855

1381 Plan of Benzert Road on this sheet.
856 Plan of Tomman, or Uru Island, on this sheet.

Charts that have received Important Corrections.

No. 1905 England, south coast:—Southampton Water. 2631 England, south coast:—Portsmouth Harbour. 154 England, south coast:—Approaches to Falmouth. 1481 Scotland, east coast:—River Tay. 2328 Norway:—Christiansand to Sandö. 2256 Baltic:—River Dvima, from the roadstead to town of Riga. 2138 Denmark:—Approaches to the Grön Sound and the Stör Strom. 1367 Greece:—Corinth Bay and Isthmus. 1569 Africa, north coast:—Approaches to Benzert. 1381 Africa, north coast:—Benzert lakes. 360 North Atlantic Ocean:—Bermuda Islands. 2282 Arctic Ocean and Greenland Sea. 2580 Cuba, eastern portion. 1639 Gulf of Mexico:—Coasts of Louisiana and Texas from the Mississippi river to Boquillas Cerrados. 2854 Gulf of Mexico:—Tampico harbour. Approaches to Vera Cruz. 1927 Central America:—Corinto harbour (Port Realejo). Acajutla anchorage. 2689 North America, west coast:—Haro and Rosario Straits. 1922 North America, west coast:—Fraser river and Burrard inlet. 1500 Aleutian Islands:—Kadiak Island to Signam Island. 1036, Madagascar:—Anchorages on the coast of Madagascar. 40 India, west coast:—Karáchi harbour. 737 India, west coast:—Sheet 3; Arnala Island to Kundari. 2578 Sulu or Mindoro Sea, eastern part. 2577 Philippine Islands:—Between St. Bernardino and Mindoro Straits, with adjacent islands. 1270 China:—Approaches to Chemulpho anchorage. 1011 Russian Tartary:—Eastern Bosporus Strait. 856 Anchorages in New Hebrides Islands. 1730 Pacific:—Samoa or Navigator Islands.

J. D. Potter, agent.

N. Atlantic and N. Pacific Oceans. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic and North Pacific Oceans for July, 1894. Published monthly at the Hydrographic Office, Bureau of Navigation, Washington, D.C. Charles D. Sigsbee, Commander U.S. Navy, Hydrographer. *Presented by the U.S. Hydrographic Office.*

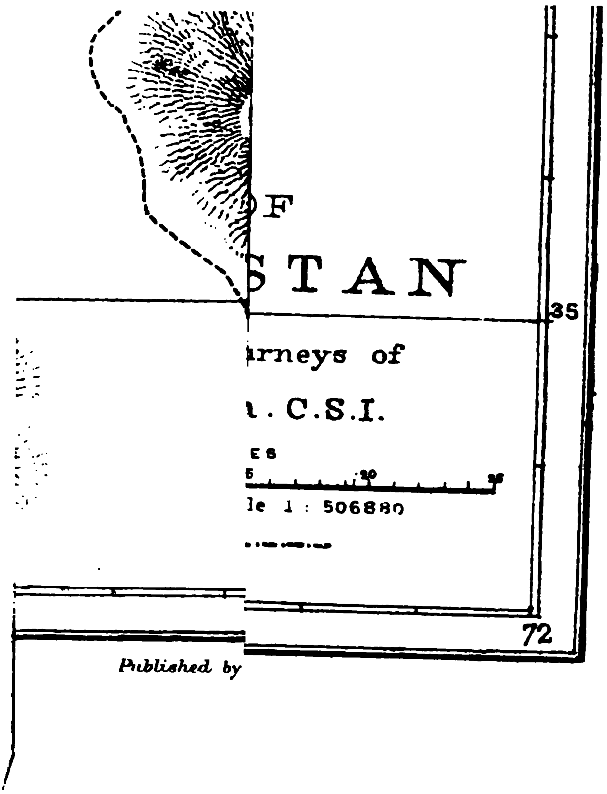
PHOTOGRAPHS.

Morocco. **Howard.**

38 Photographs of Morocco, taken by Esme Howard, Esq. *Presented by Esme Howard, Esq.*

This is a very nice series of photographs containing characteristic views taken by Mr. Esme Howard in Morocco. They embrace scenery and buildings in Tangier, Mazan, Tetuan, Fez, Mekenez, and other places.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.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The
Geographical Journal.

No. 4. OCTOBER, 1894. Vol. IV.

CONTRIBUTIONS TO THE PHYSICAL GEOGRAPHY OF BRITISH EAST AFRICA.*

By J. W. GREGORY, D.Sc., F.G.S., of the British Museum (Nat. Hist.).

I. INTRODUCTION.

In an examination of a map of Africa, one of the first points likely to be noticed is the number and size of its great lakes, the exploration of which has been the greatest stimulus to African travel since the discovery of the sources of the Nile and the course of the Congo. Anything beyond a most casual examination of the map shows that the lakes are all grouped in the eastern tropical region, and that they are here developed in two forms. There are those, such as the Nyanza and lake Moero, which are round in shape and have low shores, and those which are long and narrow in shape and have high precipitous shores, such as Tanganyika, Nyasa, and Basso Narok (Lake Rudolf). Further examination, moreover, shows that the lakes are not distributed haphazard, but on a certain definite plan. The long ones are arranged in two lines, which pass one on either side of the Nyanza and meet at the north end of Basso Narok; thence a line of lake-dotted low land, in places below the level of the sea, runs up to the Red Sea. But the Red Sea itself presents exactly the same type of structure; it is long and narrow, and, excluding some strips of coast deposits, has similarly high, steep shores. From its northern end the Gulf of Akaba leads to another valley, margined by deep high walls, and travelling along it we come to another lake situated in a deep depression, and a river in a long narrow valley. These are the Dead Sea and Jordan valley, which continue the type of structure of the East African lake chain, till it ends off in the deserts of Northern Syria.

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* Paper partly read at the Royal Geographical Society, January 15, 1894. Map, p. 384.

From Lebanon, then, almost to the Cape there runs a deep and comparatively narrow valley, margined by almost vertical sides, and occupied either by the sea, by salt steppes and old lake basins, and by a series of over twenty lakes, of which only one has an outlet to the sea. This is a condition of things absolutely unlike anything else on the surface of the earth. It is, therefore, only natural to inquire whether this great valley consists merely of a series of independent basins formed by depression or erosion, the linear arrangement of which is but an accident, or whether it is all due to a common cause, which formed a great earth crack or depression at some comparatively recent period of the earth's history. All along this valley the natives have legends of great changes in the structure of the country. The Arabs tell us that the Red Sea is simply water that did not dry up after Noah's deluge; the Somalis say that when their ancestors crossed from Arabia to Africa there was a land connection across the straits of Babel-Mandeb. The natives of Ujiji have a folk-lore that goes back to the time when the lake of Tanganyika was not; while in the extreme north, there are the better, or rather more widely known, but less definite legends of the destruction of Sodom and Gomorrah.

It may be objected that if a valley such as the one suggested could have been thus formed, why are there no others of a corresponding size and arrangement? Many such valleys are known in America, where, *e.g.*, the Yosemite can only be explained as due to the subsidence of the orographic block that formed the floor of the valley. These cases, however, are much shorter. The nearest approach in size can probably be found on the moon, whose clefts or rills no doubt represent long steeply walled valleys, and present to us much the same aspect as this East African valley would do to any inhabitants in our satellite. Not the least interesting of the points raised by the African-Red-sea-Jordan depression, is the possibility that it may explain the nature of those lunar clefts which have so long been a puzzle to astronomers.

Though the main features in the geography of most of this line of depression is now fairly well known, our information as to the geology of the African part is extremely limited, and is based mainly on the study of odd pebbles and fragments brought home by travellers. When, therefore, the offer was made to me to accompany as geologist an expedition across the Borana-Galla country to Basso Narok, and north across Somaliland to Berbera, I was naturally eager to accept it. On the kind recommendation of Sir William Flower and Dr. Woodward, the trustees of the British Museum generously granted me the necessary leave of absence.

This expedition, however, unfortunately collapsed three marches from the coast. I was extremely reluctant to return to England without having done something to repay for the wasted time, and I resolved to make a second effort to reach the line for the study of which I had gone to Africa. Too much of my ten and a half months' leave of absence had been spent on the Tana for it still to be possible to reach Basso Narok; moreover, the small force which my limited resources would allow me to employ would have been quite inadequate for the traverse of the country of the Wasuk. I resolved, therefore, to attempt to reach the highest part of the valley of subsidence between Lakes Naivasha and Baringo, as the maps suggested that the geological structure of this valley might be worked out even better there, than on the shores of the great northern lake—Basso Narok. In this opinion I was strengthened by a letter from Professor E. Suess.

As I could not wait for any instruments to be sent out, even from Bombay, I was compelled to start with a most inadequate geographical equipment; this consisted only of a prismatic compass, an Abney level, a Watkin's clinometer, an aneroid graduated only to 21 inches, and two boiling-point thermometers. For the last I have to thank my friend Mr. Bennett Stanford. I was, however, encouraged to persevere by the consideration that I could, after my return, use the maps of the Railway Survey as a base, and work from these by dead reckoning, accepting Von Höhnel's determinations of the position of Kenya. This, of course, is not scientific geography, but it seemed better to work on by this rule-of-thumb method rather than abandon geographical exploration altogether.

I should here like to express my thanks to the friends who kindly helped me to organize my caravan or to ease the way. Foremost amongst these are Messrs. W. H. Harris and J. Bennett Stanford, two members of the original expedition. They did everything that men could do to raise it after its collapse; and when they found that I was going on alone, they helped me in every possible way, and gave me a most generous present from the stores of the former expedition. To Mr. J. R. W. Piggott, the Administrator of Mombasa, I am greatly indebted for his kind hospitality during my first stay there, and for much valuable advice and help. To Drs. Macdonald and Mackinnon and Mr. C. W. Hobley I also have to express my best thanks—to the two first for some medical stores and information; and to the last, who, as head of the transport office in Mombasa, gave me much help in fitting out and selecting trade goods. The officers of the British East Africa Company's inland stations at Machakos and Kikuyu, viz. Messrs. Ainsworth, Purkiss, and Hall, also gave me the kindest assistance when passing through the stations in their care. Dr. Charters and Mr. Watson of the Scottish Mission at Kibwezi, and Mr. George Wilson, the engineer of Sir William Mackinnon's road, both helped me most generously with food, when I should otherwise have been unable to procure it. Nor must I forget my headman, Omari ben Hamadi, to whose pluck and energy and splendid devotion the expedition owes most of whatever success it may have had.

II. The Route and List of Camps.

In the first expedition we landed at Lamu, and crossed from that island to the mainland at Mkonumbi. A night's march to the east, through grass land with baobabs and forests of hyphæne palms, brought us to the historic town of Witu; by another two marches, at first across similar country, and then over the steppes and alluvial plains of the Tana, we reached Ngatana, where seven weeks later the expedition was disbanded. In the return march, Mr. Harris and I descended the right bank of the Tana to Golbanti, and thence to the coast at Marareni, passing on our way the upper marshes of the Khilifi river near Kurawa. Another march took us to Mambrui, and a rest there afforded the opportunity for a visit to the red sandhills of Magarini. Melindi is another short march along the coast, and Mombasa four days to the south of this.

The second expedition left Mombasa on the afternoon of March 23, 1893. It consisted of forty-one members, viz. a headman Omari ben Hamadi, four Askaris, thirty-three porters, a cook, a tent-boy, and myself. Though I was suffering from a severe attack of fever at the time, we started next day on our march for Machakos. We travelled *viâ* Taro, Maungu, Ndara, the Voi route to Ndi, and thence to Tzavo, where the river was in full flood. Crossing this, we made for Kibwezi and Nzaoi, where we entered the Iveti mountains, which we traversed till beyond Machakos. Thence we crossed the Kapte plains and through the forests and shambas of Ukikúyu to Fort Smith at Kabéti. Rising steadily through woody uplands, we struck the edge of the great valley of subsidence—the Graben of Professor Suess—on the summit of the Kikúyu fault scarp. A steep descent of about 800 feet brought us to the floor of the valley by the Guaso (river) Kedong. Continuing northward, we followed the valley or great meridional rift to the ridge that crosses it north of Lake Baringo. We kept close to the east wall, leaving the track at Miviruni, and reaching Baringo by a new route past a small lake, the name of which I find to be Kibibi, and along the east shore of Lake Losuguta (*syn.* L. Hannington).

During the journey numerous branch excursions were made to examine the walls of the Mau escarpment on the west, and the Kikuyu and Laikipia fault scarps on the east.

Leaving Njemps Mdogo on June 6, we started east-south-east on to Laikipia, and, keeping along the western side of this plateau, struck for the great valley, which I expected to find between the mountains called Doenyo Kinangop and Doenyo Goyito and the Aberdare mountains. We crossed the ground whereon Höhnel has placed this range, and entered the north-eastern end of Ukikúyu in the upper part of the Thagana or Sagana valley. Two days' march from this took us to the west foot of the mountain Kenya, about an hour and a half's walk from Teleki's camp at Ndóro. Our camp there was used as the base of operations on Kenya, till the exhaustion of our food-supply compelled us to return again to Ukikúyu. We traversed this country to the south, till we descended from its rolling uplands on to the lava plains of the Tana, near Maranga. We crossed the Tana—there known as the Kirorúma—just above its confluence with the Thika-Thika, and followed this river over the "Nyika" steppes, and through the gorges of the northern Iveti mountains, on to the plains of the Athi. Crossing both rivers near Chanjavi, we returned to Machakos *viâ* the Kavalúki valley. Thence by the Kapté plains and the hill country of Maká, we reached Nzaoi, and retraced our steps to Tzavo. There we diverged to the east, down the Sabaki valley till below the freed-slave settlement of Makongéni. A last march of four days over the hills of Giriama, through Fuladóya, Mwaiba, and Ribe, took us to Mombasa, where we arrived on Saturday, August 19, having covered 1800 miles in four days less than five months.

The list of camps in the Appendix shows the route more in detail, and will be more convenient of reference to any who may have occasion to refer to the collections made during the expedition, especially as the paper is not written in a narrative form.

III. The Physical Features of the District.

The geographical structure of British East Africa may be represented as composed of seven zones, running roughly north and south, and approximately parallel to one another. These seven zones or belts consist of three mountain ranges and four plains or plateaux.

The first of the mountain systems, both in time and proximity to the coast, is the range which may be regarded as the African "Urgebirge," as it must have formed the primitive axis of the continent, once extending from the Drakensberg of Natal to the Shoho mountains of Abyssinia, and perhaps even to the Ababd mountains of Egypt.

In British and German East Africa this primitive axis of the continent is less perfectly preserved than elsewhere, and it is often buried under vast volcanic piles, such as those of Kenya and Kilima Njaro. The principal representatives of this range consist of the Ugwéno and Paré mountains on the south side of the Anglo-German boundary; of the gneiss mountains of Bura, Taita, and Ongalea,* the numerous "bare hills" of the Railway Survey on the plains of Kikumbuliu and west of the Ndangi river, and of Bwinzau, east of Kibwezi. Further north the line is continued by the gneissose and schistose dome of the Iveti mountains and the gneiss ranges of Ithámba, Voróni, and Changabúbu on the south margin of Eastern Ukikúyu. Here the gneiss hills disappear below the lavas and agglomerates of Ukikúyu and Kenya; but north of this it again appears in the Doenyo lol Deika, the Loróghi mountains, and General Matthew's chain, and passes northward into regions geologically quite unknown. The continual recurrence of steep bare "hogsback" hills of gneiss, and the remarkable persistence in the north and south foliation and characters of the rocks, show that they are part of a common chain. This has, however, been lowered and broken by prolonged denudation, and is now breached by all the larger rivers of this part of the African counterslope. It is the third mountain system to the west that at present forms the main watershed.

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* The Kyulu mountains of the Railway Survey.

The second mountain system is better known from the size of its two most famous peaks, Kilima Njaro and Kenya. As is usual with volcanic cones, the mountains of this series are distributed more sporadically than those of the former, and so are not so important as far as the drainage of the country is concerned. The principal mountains are arranged in a meridional line from Kilima Njaro to Kenya and to Mount Lulall on the east side of Basso Narok (Lake Rudolf). The Theuka and Kyulu* mountains occur along this line between the two first mountains; I was not, however, able to visit them, and thus cannot say whether they belong to the same period of eruption or to a later one along the old line. The latter is not unlikely, as a parallel series of later date runs up the meridional rift. The two principal mountains of this series occur at points where the meridional line is traversed by one at right angles to it; thus on the parallel west of Kenya are Settima and Longonót, and on that through Kibo—the later peak of Kilima Njaro —are Mawénzi and Mount Merú.

It is important to notice that the principal rivers that have their sources on these mountains rise on the western slopes, and flow round their flanks to the east.

The third mountain belt, though the most important in Eastern African geography, does not include any very conspicuous peaks, and is overshadowed in popular estimation by the famous snowclad summits of the volcanic zone. This chain must once have been a great anticlinal or arch, extending from the Nyasa on the south to the Afar region of Abyssinia on the north; its summit then formed the main waterparting that separated the drainage into the Indian and the Atlantic oceans. A similar anticlinal may have existed further to the west in the Equatorial region; it probably diverged from the more direct one in the neighbourhood of Lake Nyasa, and curving round to the west of the Nyanza, and passing through Tanganyika, Lutan and Mwutan Nzige, reunited with the main axis to the north of Basso Narok. Between these two lines was included the area formerly only of internal drainage, but now opening to the Congo and the Nile. That this third zone is not now recognized as a distinct mountain range is due to the fact that the centre of the arch has fallen in, forming one of those valleys of subsidence with long, steep, parallel walls which Professor Suess has called "Graben." The famous Yosemite valley may be taken as a well-known type of these "rift valleys," as they may conveniently be called.

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* The Ongalea mountains of the Railway Survey.

The tops of the walls of this valley still form the water-parting, the streams on the east slope going to the Indian Ocean, and those on the west to the Congo or the Nile; but between the walls are a series of rivers which flow into lakes which, except in the single case of the Nyasa, have no outlets to the sea.

The four remaining zones are plains and plateaux which constitute the greatest superficial extent of the country. The first and lowest of these is that which is known to the Swahili as the "temborari" or coastal plain which occurs all along the shore between Lamu and Mombasa, except for a narrow strip between the estuaries of the Khilifi and Takaaunga. This coast zone is formed in the main of raised coral rock and cemented coral sand, and is covered by sand-dunes, raised beaches, and a red soil of wind-borne quartzose sand. This tract of country is generally extremely fertile and well cultivated, and is the great fruit-growing district; it supports dense groves of palms, orchards of mangoes, oranges, and limes, and extensive shambas of pineapples, cotton, and coffee. It is from these that the leading Arabs of the coast have in the past derived their wealth.

The width of the temborari varies considerably. At Mombasa it is only about two miles wide; at Takaaungu it is completely cut out by the red sandhills, which here slope steeply to the sea; at Melindi it has widened considerably, and from there to Lamu averages about 10 miles across. It is deeply indented along the coast by sinuous estuaries which branch repeatedly; the creeks thus formed often unite with those of the next estuary, and thus islands are cut off from the mainland. Thus have been formed the island of Mombasa and the Lamu Archipelago.

The passage from the temborari to the high inland plateau is in places well marked, but at other times it is somewhat indefinite, as a series of foothills leads gradually from one to the other. The former is well seen north of Freretown, where there is a single steep slope from the low coastal plain to the plateau of Ribe at the level of over 800 feet. The second condition is typically found west of Mombasa, where there is a slight rise from the Makupe ferry to the shambas of Chamgámwe at the height of 200 feet. Beyond this lies a well-watered undulating upland covered with shambas, with numerous groves of palms and plantains, large mango orchards, and extensive fields of dry rice, maize, and mtama (dhurra). The country is formed of Jurassic shales and sandstones, with some beds of limestones, and with these are associated thick masses of red sands and sandstones.

In other districts the soft Jurassic beds have been either entirely removed or left only as a series of low rounded hills, such as the three to the north of Freretown, which are known as "Ngoa Mombasa" (Kiswahili), or "Coroa Mombasa" (Portuguese). To the west of these is a low estuarine plain, from which rises the steep slope of the great inland plateau. Further north the Jurassic beds have disappeared entirely, as the hills of the red sand and Carboniferous sandstone series reach the sea, and the temborari rises gradually into the higher plateau.

The Nyika, the second plateau, is in striking contrast to the lower or foot plateau both in character and extent. It is bounded on the east by the edge of a steep escarpment, the summit of which is usually at the height of about 800 feet; thence it extends to the west as the vast barren sandy steppes which separate the mountains from the sea. The soil is red and quartzose, water is scarce except in the rainy season, and the vegetation consists in the main of loose mimosa scrub. With the exception of occasional oases and a narrow tract on either side of the rivers that traverse it, the whole country is uninhabited. As some distinctive name is needed for this belt of country, the name "Nyika" has gradually come into use.*

As far as British East Africa is concerned, the Nyika extends throughout the whole country from north to south, being broken only by a narrow belt on either side of the Tana and Sabaki. Its main western limit is at the foot of the gneiss hills of the primitive mountain axis; but in places where this has been broken through, or where it is only represented by isolated bosses such as Bwinzáu, the Nyika extends further west to the fertile plains of the next zone, or to the base of the mountains of the volcanic chain.

West of the Nyika, and generally separated from it by the primitive mountain axis, are the first of the series of high plateaux which form the great grazing lands of the interior, and for which the Masai name of Rangatan may be generally applied. The most important of these is that known as the "Kapte" plains, which stretched northward from Kilima Njaro between the Ongalea, Kyulu, and Iveti mountains to the east, and the mountains of Matumbato, Massimani, Ngongo Bagas, and Kikuyu on the west. It thus includes the plains that border the upper

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* As the country is a distinctive geographical type, it certainly seems best to adopt some native name analogous to "prairie" or "tundra." "Nyika," or "Unyika," really means the country of the Wanyika, but the Rev. W. E. Taylor uses it in his Ki-Giriama Vocabulary for "desert," which is probably a Swahili use of the word. "Nuka" in Ki-Chagga is applied to the same tract of country, but Mr. Taylor informs me that it there means "lifted up," and perhaps was given to it owing to its elevation, and Nyika may have originally meant the same. "Puri" might be more correctly adopted, as both the Wanyamwesi and Swahili use it for a scrubby plain, while the Ki-Giriama "weru" might do, as it means "steppe" rather than mere desert.

Athi, and runs eastward along the Thikathika, interrupted only by a few miles of sandy Nyika, till it crosses the Kiroruma and ends at the hill land of East Ukikúyu. Due north of this, and separated from it by the comparatively narrow stretch of Ukikúyu, is the high plateau of Laikipia; this stretches northward from Ukikúyu between Kenya and the Doenyo lol Deika on the east, and Settima and the edge of the fault-scarp of the great rift-valley on the west.

A third Rangatan occurs to the west of the rift-valley, and slopes slowly down to the basin of the Nyanza. It is known, from the colour of its soil, as Rangatan Nyuki, or the "Red Plain;" it is traversed by the Guaso Nyuki.

These Rangatan resemble one another closely in their general scenery, which is in striking contrast to that of the Nyuki, for their lava soil is extremely rich; they retain moisture well, and are in consequence covered with rich long grass, which, as it ripens, turns a light golden yellow, and from its vast extent reminds one of the great corn-clad prairies of Dakota. When the grass is low and green, the springy turf and well-rounded undulations, and steep, narrow, and often dry valleys give the country the aspect of our chalk-down scenery. It is on these plains that, if the experiment of European colonization be attempted, the best sites for the first settlements may be found.

The last of the eight zones is the most remarkable of them all, consisting as it does of the floor of the great valley of subsidence which runs from Nyasa to Afar, and which in British East Africa extends from the German frontier on Lake Natron to north of Basso Narok. The valley usually has a flat, level floor, bounded on either side by the escarpments, or more correctly the fault-scarps, of Mau, Kamasia, and Karamoyo on the west, and those of Ngongo Bagas, Kikuyu, Kinangop, Laikipia, and Samburu on the east. The description of this rift-valley, with its lines of but recently extinct volcanoes, its lakes and rivers, and the scarps of its innumerable faults, will be given in Section VIII.

The following diagrammatic section will show in brief the structure of the country, on an east and west traverse from the coastal "temborari," over the foot plateau, Nyika, the primitive mountain axis, the volcanic chain, and the Rangatan zone to the rift-valley and its fault-scarp walls:—

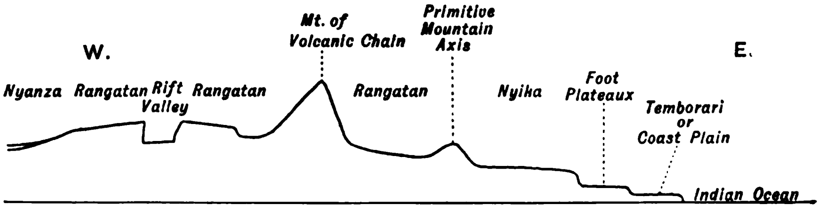

FIG. 1.

IV. The Coast Zone and the "Broads" of the Tana.

Since the journeys of Von der Decken, Wakefield, and New, our knowledge of the coast zone has, in spite of its accessibility, been allowed to lag, except for the actual course of the Tana and the neighbourhood of the chief ports. Lieutenant Smith has, however, given a good account of the country south of Mombasa, in a recent memoir. A series of excursions over the estuarine plains of the Tana and Ozi, as well as the marches from Mkonumbi to Ngatana, and thence to Melindi, gave me opportunities for an examination of a good deal of the country. This may be divided into four types: (1) the actual coast deposits; (2) the river valleys; (3) the more open sandy "barra;" and (4) the hills of the "red sand series." The country as a rule is low, but the dunes are often high, reaching the height of 250 feet on Lamu Island, while they are also very conspicuous near the German cotton plantations at Ras Chagga, near Kipini, and north of the mouth of the Khilifi river, near Kurawa. The red sandhills also often attain a considerable elevation, and are about 400 feet near Magarini. The soil is often very rich, though there is a great deal of barren sandy ground. The low alluvial plains near the mouth of the Tana are especially fertile, and are flooded twice a year; they are, however, extremely unhealthy. Raised coral rock occur as far inland as Witu.

The descriptions of New and Wakefield give a good idea of the country south of the Tana, and those of Peters of the district opposite the Lamu archipelago, and between that and the Tana. The agricultural capabilities have been described by Mr. W. W. A. Fitzgerald, in a report to the British East African Company.

The new features noted in the structural geography of the country may be considered in reference to the rivers, lakes, and hills.

The Tana is the principal river, and its course has been described by New, Peters, and Gedge, the last from observations by the officers of the I.B.E.A. Company's Tana expedition. The two points to which I wish here to refer are the changes in the former course of the river and the origin of its lakes. When canoeing down the river, one sees frequent traces of false bedding in the banks, and this is often so arranged as to indicate that the Tana is now cutting across the bed of a former river almost at right angles. In the march from Witu to Ngatana, we thrice crossed a deep, dry "nullah," or channel, of approximately the size of that of the Tana, and it was obvious that at no very distant date this river flowed along a very different line to that which it occupies at present. This could have been readily inferred from the character of the country without any such direct evidence, for the whole of the great sheet of river alluvium that spreads out from the Tana must have been deposited during meanderings of the river from one side of the valley to the other. By excursions from our camp at Vuju, in Ngatana, I was able to find the river-bed at many places, and thus to mark its course approximately on the accompanying map. Before the last great change in the direction of the river, it left its present course at Ngatana, flowed across the barra and through the woods at some distance to the east, and finally entered its present channel a little below Ngao. Both the Wapokomo and the Galla have traditions of the change, as I afterwards found from Herrn Wirth and Beking at Ngao, and the late Mr. Edmunds of Golbanti. The Gallas told the last that the change occurred a little before the time of the oldest living inhabitant of the district, but some of them remembered seeing a little water flowing along the old channel. The river had been the boundary between the Bararetta and Kofira Gallas, and its old channel is still accepted as the line of demarcation.

The changes of direction must be more frequent nearer the mouth of the Tana, as they are there largely aided by the regularity of the wind. This blowing up a reach causes an eddy on the inner side of a sharp bend; sediment is deposited in the dead water above this, and a bar thus formed partially across the stream. The current is therefore directed as from a nozzle on to the opposite bank; this is rapidly eroded, and thus the surrounding country, much of which is below the level of the river, is flooded.

It is necessary to consider these changes in connection with the formation of the Tana lakes, for it is a misconception of their nature that has led many geographers to doubt the mapping of the earlier explorers. The lakes are five in number, while there are innumerable swamps which represent former lakes.

Galla name.	*Pokomo name.*	
Ashaka Babo.		Near Ngao, on right bank of Tana.
Kongalolo.		South of Ashaka Babo.
Musania.		Opposite Ashaka Babo, on left bank of Tana.
Nakalo (*i.e.* "the place of lions").	Somite.	Ditto, north of Musania.
	Dumi.	Near Merifano, south of Ngatana, on right bank.

The only lake of the series which has been previously recorded is Ashaka Babo, and the Tana is generally represented as flowing through it.[*] New first visited it by the channel just above Negao, which is now in much the same condition as when he canoed up it. It is united to the Tana by a second outlet, which passes through Lake Kongalolo, and joins the Tana at Kaekwa, just above Borabini (Golbanti).

Lake Dumi is the one furthest up the river; it also has an outlet to the river in the rainy season.

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[*] Mr. Hobley has, however, referred to some of them in his recent paper on "People, Places, and Prospects in British East Africa," *Geographical Journal*, Aug. 1894.

Musania and Somite are both rounded in shape, and have no outlet. The origin and character of the Tana lakes can best be explained by comparing them with the well-known Norfolk Broads, which have been formed in precisely the same manner, and present remarkable analogies in scenery, shape, and position. In a paper upon "The Physical Features of the Norfolk Broads,"* I pointed out that these were due to the formation of a bar across the mouth of an estuary that once covered the site of the town of Yarmouth. The bar was formed by sand being drifted southward by the tide; sediment was deposited by the river inside the bar, and thus helped to complete it, and further to divert the river to the south. The silting thus commenced worked backwards up the estuary, while the growth of rushes and the accumulation of the sediment caught by them, caused a bank of alluvium (known in Norfolk as the "rand") to grow inwards from the margins of the valley. The rivers deposited their burdens of mud and silt where they entered the estuary, and thus built embankments out into it. Thus while the formation of the bar converted the estuary into a lake, this was cut up into a series of smaller ones, by the alluvial embankments. By the enlargement of these, a great alluvial plain was produced, with a river winding through it, and bordered by a series of lakes which are sometimes completely isolated from the river. Thus, in the case of the Norfolk Broads, there are some, such as Fritton, which are completely cut off from the present watercourse; others, such as Wroxham Broad, which are close to a river, and open into it by one or more channels; and others, such as the group of the Rollesby, Ormesby, and Filby Broads, which occupy branch valleys, and are connected with the main stream only by a very narrow overgrown channel.

The Tana "broads" have been formed in precisely the same way. Under the influence of the north-east monsoons, sand has drifted southward along the coast, barred the original mouth, and compelled the river, after it has reached 400 yards from the sea, to flow parallel to it for over 8 miles before it reaches it. The whole estuary has therefore been silted up except the narrow river-channel and a few lakes left as remnants of the great sheet of water that once covered the area. The Tana broads may, moreover, be classed into the same three types as those of Norfolk: thus Kongalolo and Dumi represent those which are situated on the alluvial plain, but are still connected with the river; Somite and Musania, those that are completely isolated; while Ashaka Babo, in its hollow in the "red sandhills," represents those in lateral branches of the main valley.

Ashaka Babo doubtless once had a greater extension to the north, and very likely was once continuous with Musania, which is now on the opposite side of the river. The Wapokomo have a tradition to this effect, which was told me by Herr Wirth of the Mission Station at Ngao. If so, the two lakes would have been separated in the same way as Wroxham Broad was once cut off from Hoveton Broad by the Bure, which flows between.

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* *Nat. Sci.*, vol. i. 1892, pp. 347-355.

The easternmost point reached by the Tana is at Charra, and less than two miles from this is the smaller but still considerable river of the Ozi. The two are connected by a narrow, artificial channel called the Belezoni Canal. At the point where this enters the Ozi the river turns eastward, which is its main direction as far as the old settlement of Kau. Here the Magagoni enters it from the north, and the two flow to the south-east. They are soon joined by the Kirimanda, which rises near Witu, and the three expand into a broad estuary, at the mouth of which is the port of Kipini.

The estuary is so large that it is not surprising that a long course has been generally assigned to the Ozi, and in the older maps it appears as a more important river than the Tana. A native, however, gave New some information which, if it had been believed or noticed, would have shown the course of the Ozi to be very short. I believe the river rises in an enormous swamp, which extends from opposite Golbanti to north of Ngao, on the left bank of the Tana. I involuntarily explored this, and in the middle found a channel flowing to the south, away from the Tana, and toward the Ozi. If so, then the river is limited—exclusive of its windings—to a length of 10 miles above the entrance to the Belezoni Canal. Had it been any longer, I must have crossed it on a march from Witu to Ngao, during which I kept well to the south of the ordinary track. The only thing at all like a river-channel then crossed was a swampy depression that must be the upper part of the Magagoni.

The Khilifi is another river much exaggerated and misrepresented on the maps. It really rises in two swamps, one of which is crossed about two hours north-west of Kurawa, and the other occupies the depression at the foot of the hill on which that well-known camping-ground is situated. The water from these two unite and expand into an enormous swamp, three miles in width. It is separated from the sea by a narrow stretch of sandhills, which turns the river to the south. The real length of the river appears to be only about 10 miles. The Mamareni marked to the south of it has practically no existence.

Most of the coast country is very low, but there is a line of hills near the coast composed of a series of red sands, to which I propose to refer as the Magarini Sands. They form picturesque, rounded, isolated hills as just west of Merifano, undulating uplands as west of Ngao, or a chain as at Magarini. At the last they rise to the level of about 400 feet. In the march along the coastal plain north of Melindi these red sandhills are conspicuous features, but south of it they appear less important, owing to their proximity to the coast, and the greater elevation of the sandstone hills of Giriama and Shimba.

V. THE GIRIAMA HILL-LANDS.

This is the tract of upland stretching south from the Sabaki to Mombasa. It is bounded to the west by the "Nyika," and to the east by the coastal plain. The general aspect of the country has been well described by New and Wakefield, and more recently by Rev. W. E. Taylor in the admirable introduction to his Giriama Vocabulary.

A line along the western border was mapped by the Railway Survey, but as I crossed its summit, to the east of the Railway route, I was able to collect many new place-names.

VI. THE IVETI MOUNTAINS.

East of Nzaoi and south of Machakos is a great tract of rolling upland cut up by numerous sinuous and deep ravines. One part of the country is known to the Wakamba as Ulu, a name which has been extended by Von Höhnel, under the name of "Ulu Berge," to the whole group of mountains; the Railway Survey have correctly restricted the term to its proper limit. As both topographically and geologically this group of mountains and ridges forms a definite system, a name for it is wanted. Mr. J. Ainsworth, the superintendent of the Machakos station, whose knowledge of the district is unequalled, and who has prepared a most admirable map of the north-western part, recommends the name of the "Iveti Mountains," after the principal district; as this is the name by which they are known to the Swahili, it is the best that could be found.

The mountains consist of a series of concentric ridges of gneiss round a central area of elevation. This arrangement is now obscured by faulting along the west, and probably also on the south side. If this be borne in mind, the topography becomes fairly simple, though otherwise it would appear very puzzling.

The first principal ridge seen, when approaching from the coast, is that which terminates to the south in the bold gneiss peak of Nzaoi. A few isolated bosses occur outside it, such as the Wakamba watch hill of Thumba. The Nzaoi ridge runs north and south till it is breached by the valley of the Kiti, east of Kilungu. Thence the outer ridges form a series sweeping round to the north-west; those immediately to the north of the Nzaoi ridge are known as Thangu and Wangu, and are represented on the north side of the Machakos river by the ridges of Mala and Kavaluki. The trend there becomes more westerly, and then, bending to the south-west, the hills of Lukenya, Malili, etc., limit the group on this side. The south side I only saw in the distance, and the arrangement may be less simple, but there the ridges seem to form a complete east and west series, continuing the ridge of Methu, near

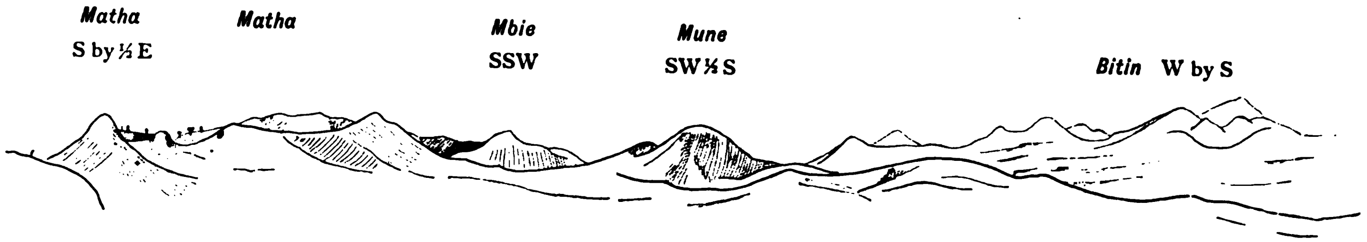

Fig. 2.—S. Iveti Mountains: View to South-west from camp at Nzaoi.

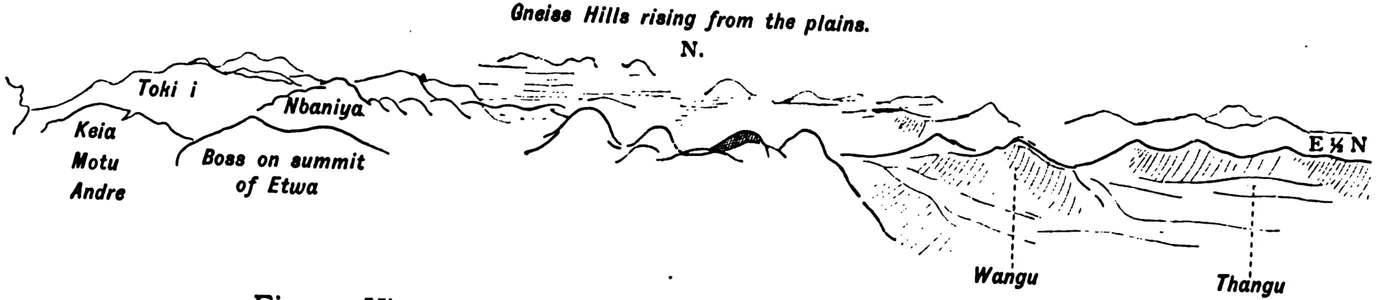
Gneiss Hills rising from the plains.
N.
Toki i
Keia
Motu
Andre
Nbaniya
Boss on summit of Etwa
Wangu
Thangu
E ½ N

Fig. 3.—View to North from summit of Mt. Etwa near Kilungu.

Nzaoi. The central area is more complex, but the east and west direction of the southern part is seen in the ridges of Meia, Wanue, and Mavu on the right slopes of the Kiti valley. The principal ridges are shown in sketch map (inset map on Map, p. 384).

VII. The Kikúyu Uplands.

The country of the Wa-Kikúyu consists of a long belt stretching from Ngongo Bagas, north-north-eastward to the southern slopes of Kenya; it is about 100 miles long and 30 broad. It appears to be composed entirely of volcanic rocks, though some ridges of gneiss, as, *e.g.*, Changababu, come close up to the southern margin at the eastern end; the soil is therefore very fertile, and was richly wooded. It is densely populated, though on the north side the plantations occur only in clearings in the forests owing to fear of the Masai. On the south side the country is lower, the rainfall less, and the forests are replaced by woody scrub, most of which has been cleared.

The topography of the country is rendered extremely puzzling, as the surface is cut up by the most complex valley system I have ever seen; the origin of this I should have tried to work out had the natives been less unfriendly. It appears to have been due to some such sequence of events as follows. The main slope of the country was determined by the subsidence of the district now covered by the Kapté plains and the lava plains of the upper Tana; as Laikipia remained fixed, this movement gave the whole of Ukikúyu a south-eastern slope. The rainfall being very heavy, the rocks easily denuded, and very variable in hardness, the streams cut a series of deep and sinuous gorges. Another cause of irregularity was that numerous lakes occurred in hollows, and these have now been drained by the basal corrosion of the streams; these all flow into the Tana, either directly or by the Thikathika.

In the return march we crossed the country at almost its widest part, south of Ndoro, and through the previously unvisited districts of Kornu, Kithu-Uri, and Maranga.

VIII. The Rift-Valley.

The desire to study the physical and geological structure of this valley in its highest part was the main incentive to my visit to Naivasha and Baringo, and its topography may be considered in detail owing to its unique character and interest.

The mountains that form the eastern wall of the valley are first seen towards the end of the first march from Machakos. As we cross a broad turf-clad col, and wind down the picturesque valley that leads to the camping-ground of the "first Lanjoro," a line of irregular hills comes into view far on the west horizon. For two days the route lies across the broad undulating prairie of the lava-sheets of the Kapte plains. Two more marches are necessary to cross the woody uplands of Ukikúyu, and one then rises from the forests on to somewhat bare turf-clad hills. Having attained the summit of these, there is seen to the west a type of scenery quite unlike anything that has been previously seen in Africa, or which can be seen in Europe; it is a type of scenery that can best be paralleled in the Great Basin of Colorado. One is standing on the summit of an almost vertical cliff 800 feet in height, at the foot of which is a perfectly level plain, which appears absolutely barren except for a thin scrub of flat-topped mimosas at the foot of the cliff, and a fringe of large acacias along the course of the Kedong, till that river loses itself in the desert to the south. Rising from the plain in the west can be seen the cliffs of the Mau fault-scarp—or, as it is usually called, escarpment—which corresponds to the Kikúyu fault-scarp. To the north the view is limited by the splendid volcanic crater of Longonót, and the ridge of lava between its base and the east fault-scarp at Kajabe. To the south the rift-valley curves slightly, while the sky-line is partially occupied by the breached crater of Doenyo Suswá. With the exception of the two extinct volcanoes, the whole of the scenery is characterized by straight lines. Instead of the valleys having the sinuous courses due to erosion, they are straight with parallel sides, while the slopes are steep and bare, not yet having been moulded into curves by the slow action of subaerial denudation.

There are in England certain cliffs which are due to faults, but they are scarce and insignificant compared to the fault-scarps of this rift-valley, which in its height and enormous length, and in the general character of the scenery, reminded me of the great fault-scarp of the Wahsatch mountains, which forms the eastern boundary of the basin of the great salt lake of Utah.

In attempting to give a brief sketch of the topography of the highest part of the great valley of subsidence, it will be best perhaps to treat the subject in the following order: (1) the walls of the valley; (2) the floor; (3) the lakes and rivers; (4) the mountains within the valley.

THE WALLS.—Throughout the part of the valley here considered, the walls are formed by two roughly parallel lines of cliffs. That on the west is known by the general name of the Mau escarpment, or Mau mountains (Mau Kette of Von Höhnel). This extends from Lake Natron on the south side of the Anglo-German frontier, to the west of Eldalat, near Lake Nakuro; here it forks, one branch trending slightly to the east to form the narrow plateau of Kamasia, while the western branch, separated from the other by the narrow valley of the Weiwei, forms the eastern face of Elgeyo.

The eastern margin of the rift-valley is formed by a similar cliff-line; the southernmost section of this is the west face of Ngongo Bagas. This is continued northward by the part called by the Railway Survey the Kikúyu escarpment; it is here 800 feet in height, but is broken by a terrace 300 feet from the base. Further to the north the terrace thins out, but it soon reappears as the grazing plateau of Kinangóp. This is limited to the west by a low cliff face, which Gedge has called the Kinangóp escarpment. The much higher cliff which forms the eastern boundary of the plateau may be conveniently named after Settima, which rises just above it. North of the Maléwa (Murentát) the two cliffs unite, and are continued northward as the great Laikipia fault-scarp; this is broken in places into a series of parallel steps, as east of Njemps, but they appear to reunite when followed northward beyond the country of the Wasuk.

In many parts of the valley the walls are so precipitous that not even the most expert of cragsmen could scale them. This is, however, interrupted in two ways: in one the single fault-scarp is replaced by many smaller parallel ones, such as those which form the foothills of Kamasia and Laikipia, east and west of Njemps. In the second type the steep cliffs are replaced by a series of gentle slopes. The most striking case of the latter is that by which the middle road to Uganda ascends on to Mau; on the opposite side of the valley to this, is the track by which Thomson reached the plateau of Laikipia. The difference is entirely due to the geological disposition of the strata; the middle road simply follows a valley formed by a synclinal fold, which crosses the rift-valley in an approximately north-west to south-east direction. A similar synclinal appears to occur north of Baringo, and is probably continued to the west by Kimama (Lake Salisbury) and the Masange chain of lakes.

The two cliffs that bound the rift-valley were originally spoken of as mountain ranges, a term which has clung especially to the western line. It is, however, gradually being replaced by the term "escarpment," though in most German maps *kette* is still adopted. The use of the word "escarpment" is, however, not correct. At the Kedong and opposite Baringo the walls of the valley, though due to faults, may be regarded as escarpments, the rift-valley lying along the axis of an anticlinal. Elsewhere, however, they are decidedly not escarpments; thus opposite Nakuro the valley is a faulted synclinal, or, more strictly, a faulted centroclinal. The walls on each side are formed by a dip slope, interrupted by a series of cliffs formed by a parallel series of faults.

To apply the term "escarpment" to such a valley wall as this is a complete inversion of its exact meaning. The only correct term, as far as I am aware, which can be correctly applied is "fault-scarp;" but this ought to be restricted to the steep cliff portions of the valley wall, and not to the slopes between them. A new term is needed for the wall as a whole.

THE LAKE BASINS.—It has already been pointed out that the rift-valley is crossed by a series of transverse folds; it is, therefore, only natural to find that the floor of the valley has been cut up by these into a series of distinct basins, each of which is or has been occupied by a lake.

In the area under consideration there are four main basins. The descent from the Kikúyu fault-scarp leads to one which is bounded to the north by Doenyo Longonót and the ridge from which it rises; its southern limit is as yet unknown. This basin is now occupied by a level sandy plain, through which flows the river Kedong. It was, however, once the site of a vast lake, the raised terraces of which may still be seen. I propose to name this lake after Professor Suess, who has helped so largely toward the better understanding of the geology of this region of Africa.

On the north side of the Longonót ridge is the basin of Naivasha,* which is the best known of all the lakes of this series, and has been repeatedly visited by Europeans. The basin is limited to the north by the great volcanic pile of Doenyo Buru and a line of lava cliffs that runs thence to the north-east. These form to the south the long drainage slope of the Gilgil river, while they face the north with the cliffs above Elmetaita. The Naivasha basin is, therefore, bounded to the south by a fold, and to the north by a fault river.

The next basin is that occupied by the lakes Elmetaita and Nakuro, which are separated by a ridge. The walls of this basin present a very different aspect to those of Naivasha, for the dip of the beds is here toward the valley, so that it is a synclinal, with the sides broken by meridional trough faults. Moreover, the main synclinal is here traversed by a secondary one at right angles to it, so that the basin is really a great centroclinal. The extensive volcanic action and faulting around Elmetaita rather obscures the arrangement, which is better shown around Nakuro.

An anticlinal ridge to the north of Elmetaita and Nakuro separates them from the great basin of Baringo, which has now been split up by faults into at least four sub-basins. The first of these occupies the south and south-western parts of the basin. It is occupied in the main by a series of swamps surrounded by terraces; some of the swamps lie in completely isolated depressions, while others discharge into the Miviruni or the Nyuki, which drain the western side of the Baringo basin. The usual caravan route to Baringo lies across this district.

Running almost due north from near the camp at Miviruni is a long ridge sloping to the west, and facing the east with a vertical fault face. As this ridge is of great importance in the structure and geology of the basin, it is advisable to give it a name; as I could learn of no native one, and the district is rarely inhabited, I propose to call it the Equator Ridge, and the peak at its south end the Equator Peak, as it is almost upon the line. The ridge cuts off the south-east corner of the Baringo basin, and is occupied by a small lake, which was visited and not named by Teleki and Von Höhnel; it is known to the natives as Kibibi, but this sounds much like a Swahili name.* The basin is broken upon the west side by a series of fault-scarps parallel to the Equator Ridge. This sub-basin is of considerable interest from the diagrammatic simplicity of its structure; it is really a secondary rift-valley within the major one.

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* *Naivasha* is the Masai word for "lake," just as *Tana* in Kipokomo means "river;" hence to speak of Lake Naivasha or the Tana river is tautologous.

The third sub-basin is occupied by the lake known to the natives as Lake Losugúta (or possibly to one tribe as Lake Gonionábur), and in Europe as Lake Hannington. This is bounded to the east by the highest and steepest cliff face in the district, from the summit of which we enjoyed the grandest and most beautiful view which I saw in Africa, and which fully atoned for the extra marches and hardships, and the scarcity of water, during our journey over the faulted ridges of this district. At our feet, at the base of a precipice over 1900 feet in height, lay the long river-like lake, reminding me somewhat of our own Windermere. As a rule the colour effects in Africa were disappointing, but here was certainly an exception. The colour of the water is an exquisite blue, rivalling that of an Alpine lake, and suggesting at once its great depth and the minuteness of its floating impurities; the blue was broken by the dark green of the flat-topped acacias that cover the numerous islets, by the lighter green of vast floating masses of algæ, and by a number of delicate pink patches. These puzzled me much as I watched them at a distance, but on closer examination they turned out to be vast flocks of flamingoes. In striking contrast to the colour of the lake is a series of low white cliffs on the western shore, which are probably composed of silicious sinter deposited by the hot springs. Above these cliffs the ground is cut up by a great number of parallel step faults, and terrace rises above terrace, and tier above tier, till the whole of the western shore looks like a great amphitheatre rising to the summit of Doenyo Lugurumut level with our camp. Still further to the west, across the valley in which lies the ordinary caravan route, rises the dark grey escarpment of the rich food-bearing plateau of Kamasia. This can be followed past the bold outline of Doenyo Lubukwe and across the green swampy steppes of Njemps, till far to the north it slowly sinks to the transverse synclinal, the southern limb of which forms the northern end of the basin of Baringo. To the north of this is the basin in which lie the vast salt steppes of Sukut, which is probably another centroclinal like that of Elmetaita and Nakuro.

The floor of the valley has thus a very complex structure, and it is only natural to find that the rocks of which it is composed, and consequently the scenery, are both very varied. The harder rocks are all volcanic, and consist either of more or less perfect craters, the remains of denuded cores, long ribs of rock thrown by faults across the valley, and lava streams retaining their original extent and character. The greatest extent, however, superficially is occupied by alluvial and pleistocene deposits, consisting of expanses of blown sand, alluvium, talus fans, and beaches around the existing and former lakes. Along the river-courses there are thick beds of gravel and brick-earth, with layers of fine porcelain clay, which is in places baked to porcelanite by the lava streams that have flowed across it.

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* If so it would mean "little lady," but it is difficult to see how it could be used in this connection, unless it were a reference to the mosquitoes that abound there.

THE LAKES OF THE RIFT-VALLEY.—Leaving the structure of the valley, let us turn to the lakes along its floor, of which there are six—Naivasha, Elmetaita, Nakuro, Kibibi, Losuguta (Hannington), and Baringo; but in addition to these there are four others, which are now dry. Of the first series Naivasha is by far the best known, though our knowledge of its fauna is very limited; it is generally reported that it contains neither fish nor crocodiles, a view which has doubtless helped the acceptance of the view of its formation being due to barriers of volcanic *débris*, having dammed back the waters of the two streams that enter its northern end.* Dr. Fischer, however, says † that some small fish are fairly common in it.

The lake is roughly lozenge-shaped in form, and covers an area of 70 square miles. Its altitude I calculate to be 6200 feet. It is given by Thomson at 6000 feet; by the Railway Survey at 6350 feet; and by Von Höhnel at 6100 feet. It receives the waters of two rivers, the Malewa or Murentat, and the Gilgil, which enters the northern end, and two streams on the east side. The southernmost of these flows through a somewhat deep cañon, but in its lower course it is above the level of the surrounding country. In spite of the fact that the lake has no visible outlet, the water is quite fresh.

The lake is well known, as it has been repeatedly visited since its discovery by Fischer; it has been mapped with care by Von Höhnel and the Railway Survey; while a large manuscript map, by Mr. Gedge, is in the possession of the British East African Company. As to the origin of the lake, there has been some difference of opinion. Thomson and Gibson regard it as due to the damming back of the waters of the Gilgil and Malewa, by the *débris* that fell during the eruptions of Longonót.‡ The Railway Survey, however, showed that it is not so shallow as was thought, but that in the centre there is a submerged crater, which I had independently suspected from a view from the summit of Longonót. The southern limit of the basin is unquestionably formed by the ridge crowned by the crater of Longonót; but this ridge is not a mere pile of volcanic ejectaments, but has been formed by "negative elevation," *i.e.* it remained fixed during the subsidence of the ground to the north and south.

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* Thomson, 'Masai-Land,' edit. 1887, p. 199.

† 'Mitth. Geogr. Gesell.,' Hamburg, 1882–3, p. 78.

‡ Thomson, *op. cit.*, p. 199; W. Gibson, Rep. Proc. Brit. Ass., 1893, p. 758.

Elmetaita (*syn.* Angata Nairogua) is now a small lake, only 6 miles in length and 2 miles in breadth. It is bounded to the east by a vertical fault-scarp of very recent date; its west shore is low, and the lake once extended far to the westward, over what is now a level, sandy, salt steppe. Its waters are very bitter, and it contains a good deal of carbonate of soda. Two streams flow into it, the Kariandusi at its south-east corner, and the Guaso Nagut at the north end; the former drains a valley between the fault-scarps of the Dondole mountains, and the latter the area to the south of the Menengai anticlinal. The western boundary of the basin is a fault-ridge, which separates it from that of Lake Nakuro.

The shore of the lake is covered with grasses and sedges, while its waters yield masses of a green alga, some small amphipods, and insect larvæ. The altitude is given by the Railway Survey as 6000 feet, and by Von Höhnel as 6037 feet; my boiling-point observations on the shore place it at 5880 feet.

Lake Nakuro, or Nakuro Sekelai. This is a close neighbour of Elmetaita, and was no doubt once connected with it. It occupies a centroclinal depression on the west side of the rift-valley, the drainage of which it receives by three small rivers. The lake is at present about 9 miles long and 4½ broad. Its altitude may be estimated at 5860 feet; its water is said to be very salt. Nothing is known of its flora or fauna.

Lake Kibibi is the next of the series. It was discovered by Teleki and Von Höhnel, who visited it from their camp at Miviruni. They did not name it, and the only writer who appears to have referred to it is Professor Suess. Höhnel has only dotted its outline, and remarks that it is sometimes dry; but as it was approximately of the same size when I visited it at a very different season of the year, I should doubt if it is ever quite dry. It must at one time, however, have covered thrice its present area. Several valleys lead down to the lake, but, though it rained heavily every day while I was to the south of it, the stream-beds were all dry, and it is probably mainly supplied by springs upon its floor. It appears to be very shallow. We could not find any fish in it. The altitude is 4820 feet.

Lake Losuguta is the longest lake in the series, and by far the most beautiful and interesting. But, though near the great trade route to Njemps, it has been always missed until it was discovered by Teleki and Höhnel, who visited its northern end. It was correctly marked on Von Höhnel's map, but the Railway Survey have not only missed it, but in the index map runs two rivers across its site.

A lake is marked by Thomson and Ravenstein a little to the north of this, which I thought must be intended for it; but the total difference in size and shape, as well as in position and in the rivers that enter it, shows that this cannot be the case. Their lake really represents the swamp to the east-north-east of Njemps, which it does fairly accurately. The two rivers, however, that enter it from the south and east of "Donyo Lugurumut" have no existence, as they flow across the site of Lake Losuguta.

Von Höhnel's map well shows its general proportions, though the outline requires many alterations in detail. He does not mark any river as entering the lake, whereas one flows into the north end, which is second in volume amongst those of this part of the rift-valley only to the Malewa. It was so deep and rapid where we wanted to cross, that we were delayed till we could find a place sufficiently narrow to bridge. Until its correct name be discovered, it may be referred to as the Hannington river. It rises near the south end of the lake, on the great plateau on the eastern side, north of my fiftieth camp. It thence flows down a narrow valley for probably 7 miles to the north; it then bends sharply back to the south, passes between the main escarpment and a group of foothills seen from the camp at "Maji Moto," and enters a swamp at the north end of the lake. In this its course is broken by some rapids and an 8-foot waterfall.

The water of the lake is said by Von Höhnel to be lukewarm, but at its south end it was slightly cooler than the air at eleven o'clock in the morning. Its waters are intensely disagreeable to the taste, with a putrid sulphurous flavour, and acted as a very prompt emetic upon the men who drank any. Both Höhnel and Thomson record hot springs in this locality, but though I saw what appeared to be such at the south end of the lake and on the east shore, I was not able to reach them.

The lake is about 10 miles long, and its breadth varies from 1 to 3½ miles. The water is often of a bright green, owing to the number of algæ that live in it, but I was not able to find any animal life within it.

The altitude of the lake, as determined by boiling-point observations, I calculate at 3050 feet. The water was standing at the time some feet above its normal level, as trunks of dead trees with the leaves still hanging stood out in the lake, while acres of yellow rotten grass were submerged along the shore. From this mass of decaying vegetation there arose a stench which, combined with the intense damp heat and the long march without drinking-water, told severely on the health of the men.

Lake Baringo is the most northern of this series, and is also the largest in extent. The first European who reached it was Mr. Joseph Thomson, who determined its true extent and the absence of the asserted connection with the Victoria Nyanza. It was subsequently visited by Teleki and Höhnel. Mr. Thomson went round the lake, but he was busy elephant-shooting, and was often some distance from its shores.

Teleki and Höhnel passed at a little distance from its western and eastern sides. The maps of these travellers showed such striking differences in the shape of the lake, the rivers that flow into it, the distribution of its islands, and the arrangement of the mountains on its eastern shore, that I resolved to follow its shore-line to settle these points in its topography. I had also intended to survey the passes that lead northward on to the steppes of the salt plains of Sukut, in order to determine the line of its probable outflow to the north. A scare of a Wasak raid, however, led to the mutiny of the ten men I had with me, and I was for a while left with only a Mkauvi guide. I could not venture, therefore, far from the lake.

Baringo is 15 miles long and 8 miles broad; it covers about 100 square miles. Its altitude, from my aneroid readings, taken at the same hour on following days so as to avoid diurnal variation, show it to be 120 feet lower than Njemps Ndogo. The elevation of this, my boiling-point observations determine as 3320 feet above the sea Thomson gives the altitude of the lake at 3217 feet, Von Höhnel at 3660 feet, and the Railway Survey as 3300 feet, while I make it to be 3200 feet.

The river-system of Baringo has been very differently represented by previous cartographers. Thomson says that five rivers enter it; Von Höhnel and the Railway Survey reduce the number to three; Ravenstein retains five, but arranges them differently to Thomson. I could, however, only find two, the Guaso Tigirish and the Guaso Boli, which are as represented by Von Höhnel. Both this author and Thomson show a river entering the north-east corner of the lake. The former calls this the Mugutan, having as a tributary the Seremas, while Thomson names it the G. Mogodeni. It, however, never reaches the lake. At the point where they mark its mouth there is really an outlet, as when the lake is high the water drains into the porous lava sheet, which here runs down to the shore. The Mugutan is probably lost in the same lava sheet. The mistake, no doubt, arose from both explorers mistaking the fertile level lava plain for a tract of alluvium beside the mouth of a river.

The Guaso Nyuki does not reach the lake, but is lost in a swamp east of Njemps Mkuba. A little north of the Guaso Boli there is a dry stream-bed, which must be a powerful torrent after storms. It has not been marked on previous maps. Its name is the Guaso Duk.

The course of the Guaso Ndau has also been misunderstood. It is a tributary of the G. Tigirish, which it reaches in the swamp near its mouth. It was omitted from Von Höhnel's map, but where we crossed it was a rapid stream 3 feet deep and 12 yards wide, and flowing between banks raised above the level of the surrounding plain. It receives the drainage of the Mkuyuni valley and parts of the Kamasia foothills; but it must have a subterranean course, as for some distance its bed is dry. Its upper branches appear to have been called the Kamnye and the Susien or Suseira; but from my guide and the people at Njemps Mkuba, I could only get the name Ndau.

The islands in the lake are of considerable interest, as the main series appear to be the remains of a volcanic crater broken up by faults as well as ordinary denudation. I was disappointed at not being able to get into communication with the Wakauvi, who inhabit them, and thus had to be content with a distant view. There are nine islands in all, of which six form a small archipelago near the southern end. The largest, highest, and central is named Langari; it is crescentic in shape, and has a steep inner and more gradual outer slope. Sections at its broken end show what are probably lava beds between layers of volcanic ash; the whole seems to have a quaquaversal dip. North of Langari are two small islands known as Loel Divis; to the east is a long narrow one named Mandadu; to the south-west is Lukrum.

The islands at the northern end are near the shore, and are merely bosses of lava that have been separated from the shore ridges by denudation. The two largest are named Somiten and Logobiti.

The last point on the topography that has to be noticed is the character of the east shore. Von Höhnel shows a mountain chain here running right down to the lake; but a tract of alluvium more than two miles wide separates it from the fault-scarp, which forms the western margin of Doenyo Lersubugo, which is here the lowest of the foothills of Laikipia. An island-like boss of lava rising from the plain forms a conspicuous feature on the eastern shore, and is known as Logwamara.

It has been remarked several times during the description of the present lakes, that these were once far more extensive than at present. Baringo especially must have had a much greater extent, and once had an outlet to the north.

There is evidence, moreover, of the former existence of a series of lakes which are now quite dry. The largest of these is south of Lake Naivasha, and it must have far exceeded in size all the existing ones put together. Its extent is shown by a series of lake terraces high up along the sides of the fault-scarps of the rift-valley. The lake must have extended right across the valley; its southern limits are quite unknown, while that to the north is very uncertain. It may have been continuous with Naivasha, or have ended against the Longonót anticlinal. I propose to name it Lake Suess, after the distinguished geologist who has thrown so much light on the geology of East Africa.

Another dry lake basin exists near Miviruni, to the north of Nakuro and west of the Kibibi basin.

Summary of Classification of the Lake Basins—

Naivasha } transverse synclinals faulted in along the axis of a meridional
Baringo } anticlinal.

Elmeteita } together occupy a centroclinal.
Nakuro }

Kibibi }
Losuguta } secondary rift-valleys on the floor of the major rift-valley.
Miviruni }

THE MOUNTAINS OF THE RIFT-VALLEY.—Excluding fault-ridges and lava streams, the mountains of the rift-valley consist solely of volcanic craters, which are disposed in the main on a north and south line.

The southernmost is the vast mass of Doenyo Suswa, opposite the fault-scarp of Ngongo Bagas. It has a width at its base of 9 miles, and its height is estimated by Von Höhnel at about 7870 feet. Its north wall is breached, and a smaller crater has been developed within it.

North of this is a much older cone, composed of a red andesite and rhyolite, to the colour of which it owes its name of Doenyo Nyuki ("Red Mountain"). On the lower flanks are some beds of pumiceous volcanic ash and tuff, and on the south side a prettily wooded gorge has cut through a parasitic cone, giving a section of diagrammatic clearness. The mountain is now only about 640 feet in height above the valley floor, but it must once have been very much higher.

Three miles to the west of the foot of Doenyo Nyuki is the lowest and most recent of the lava flows from Doenyo Longonót, the largest and most perfect crater in this part of the rift-valley. It was visited by Thomson, who climbed to the rim of the crater, the height of which he estimates at 9000 feet. I succeeded in gaining the summit of the highest pinnacle; boiling-point determinations gave its height as 9350 feet, which is 2140 feet above the summit of the pass at the east foot of the mountain, and 3000 feet above that of the surrounding plain. The rim of the crater is not so sharp as it appears to have been at the time of Thomson's visit, for the zebras have worn a fine cinder track round its level part; the jagged north-western part of the crater is covered in scrub. The crater walls vary from 300 feet on the south, to 1000 feet on the north-west.

On the inner north wall of the crater is a powerful steam-jet, which may be on the same line of weakness as a remarkably perfect parasitic cone on the north slope.

The mountain is of some interest, not only from being probably the last of the series in age, but from the very high proportion of lava in its mass. Beds of volcanic ash play a very subordinate part in the structure of the cone.

North of Doenyo Longonót there is a considerable number of volcanic cones in the district of Ndabibi to the south-west of Naivasha. Hot springs are said to occur there by the Masai, and Mr. Martin tells me that he has seen "smoke" rising from some of the cones. This may indicate dust-coloured steam. The cones in this district are small.

Doenyo Buru is comparable in size to D. Suswa and D. Longonót.* It is situated to the north of Naivasha. Its height is estimated at 9000 feet by Thomson, and 7870 feet by Von Höhnel. It has been subjected to great denudation, and is certainly older than Longonót. On its north side are a series of steam vents, which must cover several acres in extent. The steam is attributed by the Swahili porters to Wanderobbo fires, but this is clearly incorrect.

At the south-west end of Elmeteita is a group of three faulted and denuded craters. The south-eastern one, which we may call A, consists of the crescentic north wall and a cone, which may be the remains of the central core. This crater must have risen 1800 feet above the level of the plain. The second member (B) is the most perfect of the group. It consists of a crater wall, which, though now broken up by faults and erosion, can be traced all along its former extent. A double cone rises in the centre of the crater floor.

North of Lake Baringo is yet another series of denuded basic cones, forming the Erri mountains. The cores of this group have been exposed by faults, but many of the lava streams are surprisingly fresh, and some of the craters of the steam vents on the flows are perfectly preserved. They seem to be later in age than the period when Baringo had an outlet to the north. They are older than the second set of meridional faults, which has had such a marked influence on the scenery and topography of the district.

(*To be continued.*)

EXPEDITION TO THE HADRAMUT.†

By J. THEODORE BENT.

In the proper acceptation of the term, the Hadramut at the present time is not a district running along the south-east coast of Arabia between the sea and the central desert, as is generally supposed, but it is simply a broad valley running for 100 miles or more parallel to the coast, by which the valleys of the high Arabian plateau discharge their

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* The synonymy of these three peaks is a little confused, as is shown in the following table:—

Thomson.	Von Höhnel.	Railway Survey.	Gregory.
Lolbotat.	—	—	Lolbotat.
Longonót.	Longonót or Lolbotat.	Longonót.	Longonót.
—	—	—	Doenyo Nyuki.
Doenyo Nyuki.	Ssusswa.	Suswa.	Suswa.

† Paper read at the Royal Geographical Society, May 21, 1894. Map, p. 384.

not over-abundant supply of water into the sea at Saihut, towards which place this valley gradually slopes.

Owing to the intense fanaticism of the inhabitants, this main valley has been reached only by one European before ourselves, namely, Herr Leo Hirsch, in 1893. In 1846 Von Wrede made a bold attempt to reach it, but only got as far as the collateral valley of Doan. My wife and I were the first to attempt (in the latter part of 1893 and the early part of 1894) this journey without any disguise, and with a considerable train of followers, and I think, from this very reason, we made more impression on the natives, and were able to remain there longer and see more, and establish relations with the inhabitants, which, I hope, will hereafter lead to very satisfactory results.

There is every reason to believe that anciently, too, the Hadramut meant only this valley; we learn from Himyaritic inscriptions that five centuries B.C. the name was spelt by the Himyars as it is now (namely, $\overset{t}{\text{𐩩}}\ \overset{m}{\text{𐩣}}\ \overset{r}{\text{𐩧}}\ \overset{d}{\text{𐩳}}\ \overset{h}{\text{𐩢}}$), and meant in that tongue "the enclosure or valley of death," a name which in Hebrew form corresponds exactly to that of Hazarmaveth of the tenth chapter of Genesis, and which the Greeks, in their usual slipshod manner, occasioned by their inability to pronounce a pure *h*, converted into *Chatramitæ*, a form which still survives in the Italian word *catrame*, or "pitch." The Hadramut was then chiefly celebrated for the exudations of its trees, and was the centre of the ancient trade in the various species of frankincense and myrrh. It had for its capital in the main valley a town called in the inscriptions Shabwat, on the confines of the desert, also written by ancient authors Sabbatha, Shaba, and Sabota. Hamdani tells us, in his 'Geography of the Arabian Peninsula,' that there were salt works at Shabwa, and "that the inhabitants, owing to the wars between Himyar and Medhig, left Shabwa and came down into the Hadramut, and called the place Shibam, which was originally called Shibat." Shabwa is now a deserted spot, save for Beduins, who still work the salt six days westwards from Shibam in the main valley, and the effect of salt is recognizable in the waters of all the wells of the main valley. We found an inscription at Shibam in which the name $\overset{sh}{\text{𐩦}}\ \overset{b}{\text{𐩨}}\ \overset{m}{\text{𐩣}}$ occurs, certainly dating from the third century B.C.; we may therefore argue that if Shibam was not the site of the original capital, it was at any rate a place of considerable importance centuries before our era, the centre of the frankincense trade, where the caravans were made up which brought the produce westwards by the great frankincense road across Arabia, accurate geographical details concerning which are given us by Claudius Ptolemy. Pliny gives us also a similar account, but says their capital was Thumna, which is also correct, as Thumna was the capital of the Gebaniti, a Himyaritic tribe west of the Hadramut, and the lords of the Hadramut were vassals of the Gebaniti. Of this fact we got interesting confirmation at Shibam in the seal of "Yasarhal the Elder of Shibam," for in an inscription published by M. Halévy we have the two Yasarhals and various members of this valley described as vassals of the King of the Gebaniti. These facts are especially interesting, as satisfactorily proving the accuracy of the ancient geographers concerning this Arabian valley which supplied the world with frankincense.

Broadly speaking, the district which we travelled through divides itself into three distinct portions. Firstly, the narrow coast-line, or Sahil; secondly, the high plateau, or Akaba; and thirdly, the Hadramut and the collateral valleys running into it from the plateau from the south, and from the central desert to the north.

Of these, the first is the most uninteresting. We traversed nearly the whole of the coast-line from Mokalla to Saihut, and a more uncompromisingly arid country I never saw. The most prominent feature of this coast-line is the numerous hot springs which are found here, showing volcanic agency. The most considerable of these fertilizes a large district about 10 miles inland, where the inhabitants of the town of Ghail ba Wazir exist on the cultivation of tobacco, called "Hamumi tobacco from the neighbouring Beduin tribe," and many acres of waste land are brought into cultivation by conducting the hot streams by underground channels, similar to the Persian *kanats*, in various directions about the plain. At the village of Hami, 13 miles east of Sheher Bunder, the water is so hot when it comes up from the ground that the hand can hardly bear it, and the cultivation wherever it is conducted is extremely abundant. At Dis, too, and at several other points, these running warm streams lend a precarious existence to a sparse population; but the rest of this district is nothing but sand and arid waste.

The fishing villages on the coast do, however, a considerable trade. The inhabitants dry small fish on the shore, and sell them to the Beduins who come down from the mountains, who carry them back in sacks to feed themselves and their camels in the dry season, and it is interesting to see the Beduin and his camel feeding out of the same basket on these fish. Fish oil is another very repellent production of this coast, and the odours produced by these industries are a particularly unpleasant feature of the fishing villages. Mokalla, Sheher, and Kosair are the chief towns of this district, and they carry on an active trade, with their dhows and buggalows, with Aden, Muskat, Bombay, and the Somali coast. Near Kosair a peculiar geological feature is observed in a vast area of black basaltic rock, which stretches over the flat country for miles like a field of lava. This effusion of basalt near the coast may very possibly be the source from whence the Egyptians and Assyrians got their basalt for statuary purposes. The Arabs of to-day say that this stretch of basalt is the ashes of Pagan cities. As Saihut is approached, the mountains come down close to the sea at the outlet of the great Hadramut valley. We looked earnestly for traces of antiquity along this coast-line, but, in spite of the assertion of their existence in 'The Red Sea Pilot,' we found none, and therefore concluded that the author mistook the ruins of mud villages and towers, of which there are many, for remains of an anterior civilization. We offered money to the Beduins to show us any remains; but in spite of their keen desire to obtain our money, they were unable to show us anything, and always affirmed, "There are no Addite ruins here but in the Hadramut." The people of Ad is the name given in the Koran to the old Sabæan inhabitants of Southern Arabia, and the term Addite is still applied to all their ancient remains. The negative evidence of the non-existence of ruins here is, however, in itself satisfactory, and confirm the opinion that the ancients made little or no use of this barren and almost harbourless coast, but carried on all their trade with the frankincense country by means of the above-mentioned caravan road through the interior.

The second feature of this district is much more geographically interesting, namely, the great *akaba* or high plateau which separates the Hadramut valley from the coast. It is approached by numerous short waterworn valleys, by which the various caravan roads into the interior commence the journey from the coast. We ascended the Wadi Howari, which is the largest and longest of these; and then, after a rapid rocky ascent of two days—for progress with our long train of camels was but slow—during which a few Beduin villages were passed, we reached the plateau, which extended in every direction in a flat, unbroken line as far as the eye could reach. Beyond the fact that this plateau is divided, so to speak, into two stories, the higher story being sometimes in isolated hillocks, and sometimes in long level stretches about 80 feet higher than the lower one, this vast extent of plateau is absolutely featureless. No distant elevation breaks the horizon; there is not a single habitation on it or sign of life; it is absolutely waterless except after the rains, when rain-water is preserved in tanks dug along the paths, which get dry after the long droughts, and cause the traveller infinite discomfort.

Haibal-gabrain, our first point of halt after reaching the plateau, we ascertained, is the highest point of the whole plateau. Here it reaches an elevation of 4150 feet; it slightly slopes northwards towards the main valley, and eastwards towards the Wadi Adim, and then rises again and extends for as yet an unknown distance. On the top level of the akaba there is no vegetation whatsoever, and it is in many parts scattered with small black basaltic stones as if by a gigantic pepper-pot, resting on the sandy soil, sandstone, and limestone, of which the range is formed. In the gullies between the upper and lower stories, and at a slightly lower level at the mouths of the valleys, we found a certain amount of vegetation. Here are the frankincense and myrrh trees, and various forms of mimosa, and undoubtedly this is a portion of the district which yielded the ancient wealth of the country. The further east we went the more frankincense trees we found growing, and I have reason to believe that a still large amount of this is still obtained from the Hasik district east of the Hadramut valley. It is a curious fact that the Beduins who own all this plateau do not themselves gather the produce of the trees, but let out districts to Somalis, who come over during the proper season to collect it. In ancient times we are told, by the anonymous author of the 'Periplus of the Red Sea,' that the frankincense was only collected by slaves, which gave rise to the quaint Greek legend that the fumes of the frankincense trees were deadly, and that for this reason the Hadramut was called "the valley of death."

Here and there along this plateau we came across a few Beduin women tending miserable, half-starved flocks. Here and there, in a few favoured nooks, vegetation struggled on at a terrible disadvantage; otherwise it is an absolutely deserted and unproductive district, almost oppressive in its vast solitude, but with a fresh, keen air that invigorated us after the heat of the coast. It appears to me highly probable that the systematic destruction of the frankincense and myrrh trees through countless generations has done much to alter the character of this highland plateau, and has contributed much to the gradual silting up of the Hadramut and its collateral valleys, to which fact I shall have again occasion to refer. The aspect of this plateau forcibly recalled to our minds that portion of Abyssinia which we visited last year; there is the same arid coast-line between the sea and the mountains, and the same rapid ascent to a similar absolutely level plateau, and the same draining northwards to a large river-bed—in the case of Abyssinia, into the valleys of the Mareb and other tributaries of the Nile, and in the case of this Arabian plateau, into the Hadramut. Only Abyssinia has a more copious rainfall, which makes its plateau more productive than the one before us. This high plateau is unquestionably the Maratha Mountains of Ptolemy, and Pliny tells us further (XII. 14. § 52), "In the centre of Arabia live the people of Hadramut, a tribe of the Sabæans, in an exceedingly high mountain."

As we proceeded northwards we soon began to come across the heads of the many valleys which run into the Hadramut; the Wadis Doan, Al Aisar, Al Ain, Bin Ali, and Adim all start from this elevated plateau and run nearly parallel. The curious feature of most of these valleys is their rapid descent; they appear as if they had been taken out of the high plateau like slices out of a cake. They do not appear to have been formed by a fall of water from this plateau; in fact, it is impossible that a sufficient force of water could ever have existed on this flat surface to form this elaborate valley system. In the valleys themselves there is very little slope, for we found that, with the exception of the Wadi Adim, all the valley heads we visited were nearly of uniform height with the main valley, and had a wall of rock approaching 1000 feet in height, eaten away as it were out of the plateau. We were, therefore, led to suppose that these valleys had originally been formed by the action of the sea, and that the Hadramut had once been a large fiord or arm of the sea, which, as the waters of the ocean receded, formed an outlet for the scanty water-supply of the Southern Arabian highlands. These valleys have, in the course of ages, been silted up by sand to a considerable height, below which water is always found, and the only means of obtaining water in the Hadramut for drinking purposes, as well as for cultivation, is by sinking wells. The water of the main valley is strongly impregnated with salt, but is much sweeter at the sides of the valley than in the centre. No doubt this is caused by the weight of the alkaline deposits washed down from the salt hills at Shabwa, at the head of the main valley.

The steep reddish sandstone cliffs which form the walls of these valleys are themselves almost always divided into three distinct stories or stratifications, which can be distinctly seen on the photographs. The upper one is very abrupt, the second slightly projecting and more broken, and the third formed by deposit from above. The descent into the valleys is extremely difficult at all points. Paths down which camels can just make their way have been constructed by the Beduins, by making use of the stratified formation and the gentler slopes; but only in the case of the Wadi Adim, of all the valleys we visited, is there anything approaching a gradual descent. We came down into the Wadi Al Aisar, one of the narrower ones, where there are numerous villages belonging to the Beduins of the Khailiki tribe, several members of which formed our escort. The first peep down from the edge of the plateau into these very highly cultivated gullies is most remarkable, quite like looking down into a new world after the arid coast-line and barren plateau. At our feet we saw lines of villages and palm groves; behind us we looked for the last time for many weeks on the bare monotonous plateau. After a very difficult descent on foot, we reached the village of Khaila, and encamped for two days close to the house of the chief of the tribe. Even here we were struck with the large houses and fortresses constructed by the Beduins, some of them three or four stories high, with the antlers of antelopes stuck on at the corners, and our surprise was the greater because we had looked upon the Beduins on our journey as little better than naked savages.

The Bedu of the Hadramut is very different to that of Northern Arabia. He is small, thin, and wiry, naked save for a loin-cloth, and with long matted hair, which he ties up behind his head with a leathern band. On his shoulder he carries his quaint matchlock gun, and attached to his waist girdle he has his powder and priming flask; his dagger and his arms and legs are decorated with various ornaments of brass and iron. He has much about him that reminded us of the aboriginal races of Asia Minor and Northern Persia. His conversion to

Mohammedanism is merely nominal. It is rare to see a Bedu say his prayers or perform the ablutions inculcated by the religion of the country; he does not in the least object to travel or work during Ramazan, and he never fasts; and yet at the same time he has his own religious secrets, his own particular points of religious veneration, which, like the Yoruks of Asia Minor, he prefers not to communicate to strangers. The pious Arab speaks of them as heathen; but they are distinctly powerful, and often treat the Arabs and their religious observances with undisguised contempt.

Before proceeding further with our journey, I will here say a few words concerning the somewhat complex body politic of this portion of Arabia, the inhabitants of which may be divided into four distinct classes.

Firstly, there are the numerous wild tribes of Beduins scattered all over the country, who do all the carrying trade, rear and own most of the camels, and possess large tracts of country, chiefly on the highlands and smaller valleys. They are very numerous and powerful, and the Arabs of the towns are certainly afraid of them. They never live in tents, as do the Beduins of Northern Arabia; the richer ones have quite large houses, whilst the poorer ones—those in Shabwa and the Wadi Adim, for instance—dwell in caves.

Secondly, we have the Arabs proper, a decidedly later importation into the country than the Beduins. They live in and cultivate the lands around the towns; many of them carry on trade and go to India and the Straits Settlements, and some of them are very wealthy. They also are divided into tribes. The chief of those dwelling in the Hadramut are the Yafi, Ketiri, Minhali, Amri, and Tamini. The Beduins reside amongst them, and they are constantly at war with one another, and the complex system of tribal union is exceedingly difficult to grasp.

Thirdly, we have the Seyyids and Sherifs, a sort of aristocratic hierarchy, who trace their descent from the daughter and son-in-law of the prophet. Their influence in the Hadramut is enormous, and they fan the religious superstition of the people, for to this they owe their existence. They boast that their pedigree is purer than that of any other Seyyid family, even than those of Mecca and Medina. Seyyids and Sherifs are to be found in all the large towns and considerable villages, and even the Arab sultans show them a marked respect and kiss their hands when they enter a room. They have a distinct jurisdiction of their own, and most disputed points of property, water rights, and so on, are referred to their decision. They look with peculiar distrust on the introduction of external influence into their sacred country, and are the obstructionists of the Hadramut, but at the same time their influence is decidedly towards law and order in a lawless land.

Lastly, we have the slave population of the Hadramut, all of African origin, and the freed slaves who have married and settled in the country. Most of the tillers of the soil, personal servants, and the soldiers of the sultans are of this class. They marry amongst themselves; their women never wear the veil, and mix freely with the men; many of them are well off and own good houses in the towns. They are all Mohammedans, and every new slave who is introduced into the country, if not a Mohammedan, is obliged to embrace that religion. They are not allowed to take Arabic names, but are generally known by nicknames indicative of some personal feature; nor can they ever hope to rise to a higher class. Notwithstanding this they live very contented and happy lives, especially the soldiers, who have considerable influence amongst the Beduins, and are provided with food, clothes, arms, and lodging by the sultans. Many of them have been in India, and served in the Arab regiment at Hyderabad, and acquired manners and education superior to those of the Seyyids and Arabs whose property they are.

The Al Kaiti family of the Yafi tribe is by far the richest in the Hadramut, and their history may be briefly given in a few words. About five generations ago, the Seyyids of the Abubekir family, at that time the chief Arab family in the Hadramut, claiming descent from the first of the Caliphs, were at variance with the Beduin tribes and in great difficulties, so they invited some chiefs of the Yafi tribe from the Yafi mountains halfway between the Hadramut and Aden to come to their assistance. The Al Kaiti family responded to their call, and by force of arms subdued the hostile tribes, and permanently established themselves in the main valley. Omar bin Aod Al Kaiti, the grandfather of three of the reigning sultans in the district, was a really powerful and wealthy chief. He built very fine palaces in the Hadramut at Shibam, Al Katan, Haura, and Hajarein, and his son, Sultan Nawas Yurg, the present head of the family, is now femadas or general of the Arab regiment at Hyderabad. This historical intercourse with India is the secret of the wealth of the Al Kaiti and other Hadramut families; they own properties in Bombay and other commercial centres in the East, and under their wing large numbers of the inhabitants of the valley flock to India and the Strait Settlements, where they make money more or less honestly and return to their birth-place to spend it. There is absolutely no source of wealth in the Hadramut itself, yet the valley is studded with fine palaces, and the influence of India is everywhere noticeable. Their furniture is largely imported from India, their jewelry is mostly Indian, their daggers are studded with gold mohurs; and the most peculiar feature of all this is that, in spite of this external influence, they remain fanatically opposed to the visits of Europeans into their country, and that their women by common consent never leave the country. There are instances on record of a man returning to the wife he had left in the Hadramut after an absence of forty years, and marital separations of twelve and twenty years are of common occurrence. The marriage laws of Arabia, however, provide the emigrant with the means of getting out of this difficulty, and most of those who can afford it have their harems both at home and abroad.

The sultan Nawaz Jung, though residing in India, is still the recognized ruler of the country under the Yafi sway, and all important questions are referred to his decision by his three nephews, one of whom is Vice-Sultan at Sheher, the other at Mokalla, and the third at Shibam.

AL KHOLLON.

Sultan Sallah bin Mohamed, of Shibam, dwells in a very fine palace at Al Katan, about 12 miles from his capital, a most delightful and fascinating spot, surrounded by many acres of palm groves, and nestling beneath the rocky wall which shuts in the valley—quite the ideal home for an Arabian chief as described in the 'Arabian Nights.' Space will not permit me to give a minute description of these Hadramut towns and palaces, but they will be illustrated better by my wife's photographs than by any description I could give. There is a decided monotony about Arab architecture. Most of the houses are exceedingly high, some reaching eleven storeys; they are built of sun-dried bricks, and are externally decorated with chevron and zigzag patterns. There is always a terrace on the roof, where the people sleep in the hot weather, and they are usually decorated with turrets, domes, machicolations, buttresses, etc., which give them quite a mediæval appearance. Outside in the courtyards the flocks and herds are kept and the horses are stabled at night. The lower storey is devoted to the storing of goods, the second storey is inhabited by the servants, the third by the guests, and above that come the harem and the family dwelling-rooms.

The wood carving is very well executed. Most of the doors are elaborately carved; the unglazed windows are fitted with pretty tracery; the beams, the cupboards, the invariable coffee corner, and the household utensils, are all subjects for the carver's art, and in this they excel exceedingly. Dados, with quaint patterns, run up the sides of the walls, and each storey is furnished with its skin or *mussack* of water, which is hung in a draught so that the contents may be kept cool. Each storey, too, has its bathroom, where a big jar called *Kazba* is placed, and the bath taken by throwing water over the body by means of a smaller utensil. The drainage is lamentably deficient, and is carried by long wooden spouts into the yard below; the dry climate and sandy soil are the only security against disease. The palaces of the sultans and great men of the Hadramut are exceedingly imposing, and, when seen through the surrounding palm groves, form delightful pictures.

Sultan Sallah received us most cordially, and encouraged us to stay some time under his roof, so that we might more comfortably make excursions to places of interest in the neighbourhood. Of all the men we met in the Hadramut we found Sultan Sallah the most enlightened. He complained bitterly of the benighted life he had to lead amongst his rascally and fanatical fellow-countrymen, and took great interest in all our collections and varied pursuits. He greatly envied me the possession of a wife who could do other things besides paint herself with turmeric and antimony, and lead a listless life of seclusion and squabbles in the harem, and through us he made a formal request that a trained Mohammedan doctor might be sent to the Hadramut from India, whose presence there would do an immense amount of social and political good; and I am sure that if the Indian Government acceded to this request, Sultan Sallah would be prepared to bear the greater part of the expense himself. The medical condition of the country is terribly deficient. Burning the part affected with hot irons is a favourite remedy called kayya, and one which we saw frequently applied. Then, again, they have an idea that certain smells are dangerous for certain wounds, and those afflicted are obliged to wear stoppers in their noses for fear of inhaling the smell. On to a wound they will tie iron or tin; and as women are not allowed to see medical men, their husbands take a hair from their head, from which the doctors profess to divine what the lady is suffering from. Sultan Sallah told us of a curious case which had lately come under his notice. A man for a wager consumed all the fat of a goat, and when he was subsequently taken ill, the doctor ordered a fire of wood to be lighted all round him to melt the fat, which had congealed in his inside. During our prolonged stay at Al Katan, which off and on lasted for nearly a month, we were able to see a great deal of the life and customs of the inhabitants, their mode of agriculture, and other points to which I could not do justice within the short limits of this paper.

Whilst waiting at Al Katan, it will be as well to review the principal archæological features which we observed in this district. In the Wadi Al Aisar we visited the remains of an extensive Himyaritic town, but unfortunately found no inscriptions. We saw nothing more of this character until we reached Hajarein, a town built on an isolated hill in the centre of the valley, which, as a continuation of the Wadi Doan, is thence known as the Wadi Kasr until it joins the main valley of the Hadramut. From here we visited the remains of a very extensive Himyaritic town called now Raidun by the inhabitants, being about two miles distant from Al Meshed, a somewhat sacred spot amongst the Arabs, into which the Seyyids would not allow us to penetrate. The ruins cover many acres of ground, and may be traced for a distance of two miles, and they showed us clearly the nature of the wholesale destruction which has come across the ancient civilization of the frankincense country. The ruins of certain lofty square buildings stand up on hillocks at isolated intervals; from these we got several inscriptions, which prove that they were the high "platforms" alluded to in so many Himyaritic inscribed stones raised in honour of their dead. As for the town around them, it has been entirely engulfed in sand; the then dry bed of a torrent runs through the centre, and from this fact we can ascertain, from the walls of sand on either side of the stream, that the town itself has been buried some 30 to 40 feet by this sand.

HAJAREIN.

Wherever we found ruins elsewhere in the Hadramut, they were always on some elevated spot above the sand-level, so that we may argue therefrom that all traces of ancient civilization in the centre of the valleys lie deeply buried in the sand, which has come down into the valleys in devastating masses from the plateau and the central desert. The nature of the sand in this district is twofold: firstly, we have the firm sand which can be cultivated, or *loess;* and, secondly, the disintegrated sand from the desert, which forms itself in heaps and causes sandstorms when the wind is high. I think there is every reason to believe that this ruined city near Hajarein is the Θαβάνη of Ptolemy, the Toani of Pliny, and the Doan of Hamdaui, which name is still retained in the adjacent Wadi Doan.

From Hajarein to El Katan we saw no definite traces of antiquity, although Haura, where the Al Kaiti family have a magnificent palace, is supposed to be the site of an ancient Himyaritic town. From El Katan we visited a village called Al Gran, at the southern edge of the main valley, built on the foundations of a large Himyaritic fortress; it stood on a slight elevation above the plain, and must once have been a place of considerable importance. From the mosque there we got two inscriptions, one a dedication to the god Sayan, who is known to have been especially worshipped in the Hadramut in ancient times.

Whilst staying in the town of Shibam we were taken to see a peculiar rock in an adjacent valley, on which are still legible some Himyaritic words in red distemper. We noticed the peculiar position of this stone, blocking up as it does the end of a valley, and so placed that it would receive the first rays of the morning sun. This red inscription is of great antiquity, for it is in the boustrephedon form of writing, which at once relegates it, according to the best authorities, to at least the third century before Christ. On my return home, I found out, from Prof. Hommel's invaluable dictionary of the hitherto ascertained Himyaritic words, that one word meant "morning light" and another "sacrifice;" hence we had before us an undoubted site of an ancient sun-worship, and we were forcibly reminded of the large stone on the Zimbabwe ruins and its simular orientation.

The most interesting and productive expedition which we made from Al Katan was northwards up the Wadi Ser, in the direction of the central desert. The mouth of this valley is about six miles from Shibam, and even here it is a mass of loose shifting sand. As we proceeded northwards up the valley we found the traces of habitation few, the cultivation very scanty, and fields being prepared by scraping the ground with wooden boxes or ploughs, called *mishap*, attached by chains to camels. These boxes take off the upper layer of sand, and thus form dykes, which retain the rain-water if rain does fall. Sometimes it does not fall for three years, and their labour is in vain; but one favourable season in three years, they told us, repaid them for the trouble.

At the mouth of the valley a few Arab villages of the Katiri tribe can boast of palm-trees and fair-sized houses, but further in the whole of the valley is occupied by Beduins, and as you proceed up it the masses of sand increase; here it is shifting and loose in many places, and the hills on either side of the valley grow distinctly lower.

We penetrated up this valley to a spot called Al Had, where there is a solitary house and farm occupied by a Beduin tribe, and a deep and ancient well in the centre of the valley, which is the last water before the central desert is reached, and all around us stretched masses of sand and absolute barrenness. We were told by the Beduins that formerly there had been a caravan road starting from this point across the desert, but that, owing to the want of water, it had been abandoned some time ago. The character of the valleys here is pretty much the same as that of those to the south of the main valley, only they are narrower and much lower, and thus the deep indenture of the valley system of the Hadramut gradually fades away into the vast expanse of sand of the central desert of Arabia.

A couple of miles north of Al Had we visited the very interesting site of a ruined Himyaritic town, with traces of buildings of huge stones like those of Al Meshed, and a great rock with a Himyaritic inscription chipped upon it, but unfortunately too shallow for us to make a squeeze. The central word of this inscription appears to me to be *Masabam*, or caravan station, and this spot would be exactly one long stage from Shibam on this road to the desert, which was probably either the great frankincense road itself or an important branch of it. My copy and Mrs. Bent's photograph are now in the hands of Professor Müller, of Vienna, and I hope that when it has been carefully studied it will throw some interesting light on the ancient geography of this part of Arabia. That it was a landmark is obvious, and as the inscription is evidently chiefly a list of names, we may be able to identify some of them as those mentioned by the ancient geographers.

In the Wadi Ser, near to the village of Al Garun, we found a row of very ancient stone monuments situated on slightly elevated ground above the sand. At first I imagined them to have been tombs, but on closer inspection we discovered that the stones, which are large unhewn stones of the dolmen type, are decorated on the inside with geometric patterns, somewhat similar to those found in the Mashonaland ruins, and therefore I feel more inclined to believe that they were originally used for religious purposes. The buildings are about 20 feet square, and several of them are surrounded by circular walls; they are apparently of extreme antiquity, doubtless far anterior to the other Himyaritic remains which we saw in the Hadramut.

At Al Garun the Wadi Ser is entered by a short collateral valley called the Wadi Khonab, in which valley is the tomb of the prophet Saleh, one of the principal sacred places of the district. Kabr Saleh is equally venerated with the Kabr Hud, also called the tomb of the prophet Eber—for, from what we could gather from the statements of intelligent natives, Eber and Hud are synonymous terms—which tomb is to be found in the Tamimi country further up the main valley. We encamped for the night at Al Garun, and met with considerable opposition from the Beduins and our escort when we proposed to visit the Kabr Saleh next day. However, this was overcome by threats of reporting the opposition to Sultan Sallah on our return to Al Katan. So next morning we started.

A short ride of two hours brought us nearly to the head of the Wadi Khonab, and there, situated just under the cliff, in an open wilderness, is the celebrated tomb. It consists simply of a long uncovered pile of stones, somewhat resembling a potato-pie, with a headstone at either end, and a collection of fossils from the neighbouring mountains arranged along the top. Hard by is a small house where the pilgrims take their coffee, and the house of the Beduin mollah who looks after the tomb is about a quarter of a mile off. Beyond this there is no habitation in sight. A more desolate spot could hardly be found. The tomb is from 30 to 40 feet in length, and one of the legends concerning it is that it never is the same length, sometimes being a few feet shorter, sometimes a few feet longer. The Beduins have endless legends concerning this prophet. He was a huge giant, they said, the father of the prophet Hud, or Eber; he created camels out of the rock, and hence is especially dear to the wandering Bedu; and he still works miracles, for if even unwittingly any one removes a stone from this grave, it exhibits symptoms of life, and gives the possessor much discomfort until it is returned. Once a domed building was erected over the tomb, but the prophet manifested his dislike of being thus enclosed, and it was removed. All our men treated the grave with the greatest respect, and said their prayers around it, barefoot. At the time of the ziara, or pilgrimage, we were told, crowds of Beduins from all the valleys and hills around flock to worship.

When we first got there, we were permitted to approach within a few yards of the tomb, so that we saw it very distinctly; but when, after eating our luncheon, and a siesta under a tree, we again advanced to inspect it, the Beduin mollah attacked us with fierce and opprobrious language, and, fearing to further arouse the fanaticism of these wild people, we speedily mounted our horses and rode away.

These two primitive tombs of their legendary prophets, zealously guarded and venerated by the Beduins, are a peculiar and interesting feature of the Hadramut. We were unable to visit the Kabr Hud, but I am told, on reliable Arab authority, that it is similar in every way to the Kabr Saleh—just a long pile of stones, about 40 feet in length, uncovered, and with its adjacent mosque. It is a curious fact that when one turns to the tenth chapter of Genesis—the best record we have of the earliest populations of our globe—we find the patriarchal names Salah, Eber, and Hazarmaveth, which name, as I previously stated, corresponds to Hadramut, following one another in their order. I am at a loss to account for these names being still venerated by the Beduins, unless one admits a continuity of legendary history almost too wonderful to contemplate, or else one must consider that they were heathen sites of veneration, which have, under Moslem influence, been endowed with orthodox names. Certain it is that these tombs in the midst of the wilderness are peculiarly the property of the Bedu, and, though visited, and to a certain extent venerated, by the Arabs, they do not attach so much importance to them as they do to the tombs of their own walis, or saints, which are always covered tombs, near or in the centre of the towns. Another curious point I may mention in connection with these tombs is that the Arab historian, Yaqub, in his Mu'gam ii. 100, tells us of a god in Hadramut, called Al Galsad, who was a gigantic man; perhaps this god may have something to say to the giant tombs of Saleh and Eber. Also Makrisi, who wrote in the tenth century A.D., speaks of a giant's grave he saw near Shabwa.

On our return to Al Katan, Sultan Sallah informed us that the negotiations with the hostile Katiri tribe, which he had entered into with the view of our being allowed to pass through their dominions to Kabr Hud and Bir Barhut, a curious volcano or solfatare in a cave near the grave of Hud, had failed, and that the sultans of the Katiri tribe had proclaimed, at the Friday's prayer in the mosque, that they would not admit the infidel; but that the tribes to the east of the Katiri—the Menhali, Tamimi, and Amri—had all sent us cordial invitations. Under these circumstances, Sultan Sallah advised us to return by a devious route to the coast at Sheher, and, if time permitted, to make our journey to the Eastern Hadramut direct from there. This volcano of Bir Barhut should be an extremely interesting spot. Makrisi mentions it as an awe-inspiring volcano in his book, and the Arabs to-day say it is the spot where the souls of unbelievers are sent after death. It is just possible that it may be the *Fons Stygis* of Ptolemy, though, if it is, the position he has given it is erroneous.

On leaving Hadramut, we were handed over to the tender mercies of one Talib the son of Abdullah, the chief of the Jabberi tribe, who inhabit the Wadis Bin Ali and Adim, and also trace their descent from Jabber, a friend and counsellor of Mohammed's. This journey was long and tedious, but afforded us much interest and opportunities of observing the life of the Beduin tribes through which we passed. We found other Himyaritic ruins in the Wadis Bin Ali and Adim. This latter valley, the entire course of which we traversed, has many peculiarities which distinguish it from the other valleys running into the Hadramut. It has in it a running stream called Ghail Omar (and here I may mention that all the running streams, and there are very few of them, are called Ghail), and is very fertile and full of palm groves. Excellent honey is made in the Wadi Adim, and the Hadramut is celebrated for its honey all over Southern Arabia; it is made from the palm flowers, and has a deliciously scented taste. Pliny alludes to this honey in his sixth book as being, with frankincense and flocks and herds, one of the chief products of this district. Then again the Wadi Adim gradually slopes up to the high plateau, and does not come to an abrupt termination like the other valleys. During the dry season, when there is no water in the tanks on the plateau, all the caravans to the Hadramut pass up this valley; it is far more tortuous than any of the other valleys, and stretches so far down towards the coast that the traveller has but little of the plateau to cross before descending to the sea, and seems to be the natural drain of this high plateau.

Owing to the fact, of which we were previously ignorant, that the Jabberi were at war with the Hamumi, who dwell in the narrower defiles of the Wadi Adim, we were exposed for some time to considerable difficulties and danger on this road, but eventually, with the loss of a little money paid in black mail, and having been fired at on four different occasions, we safely reached Sheher at the beginning of March. As a rule I consider travelling in Arabia, though arduous and productive of endless worries, is on the whole safe. Before entering the territory of a tribe you must have a *sayyir*, or guide, from that tribe, and when you have paid the *sayyira*, or toll money, you may travel with safety. Dangers in Arabian travel have generally arisen from travellers entering tribes without the *sayyir*, and though we were menaced, and on more than one occasion frightened for our lives, we never lost a thing during our whole journey. Sultan Houssein Al Kaiti, of Sheher, willingly engaged to send us with a sufficient escort to Bis Barhut and the Eastern Hadramut, but the season was too advanced and our resources too low to permit us of again penetrating into the interior. So we contented ourselves with making an expedition along the coast towards Saihut, which was chiefly of interest from a geographical point of view, enabling us to determine the course of the Hadramut to its outlet, and the configuration of the plateau, whilst we reserved further explorations in the interior for another season.

In conclusion, I wish publicly to tender my thanks to Imam Sharif Khan Bahadur, who accompanied us as surveyor from the Indian Government, and who worked assiduously at his map and observations during the journey, for his great assistance throughout the whole of our expedition. Owing to the distinct opposition to our expedition which was manifested by our own Government at Aden, we should have found it difficult to do even what we did do without Imam Sharif, who could in Hindustani freely converse with those of the natives who had lived in India; and I am further convinced that if our own Government had given us a more willing support, we might have been easily able to accomplish much more. As it is, thanks to Imam Sharif, we are now able to constitute a survey of a little-known district to the geographical world. Also Wm. Lunt, who accompanied us as botanist from Kew, with a grant from the Royal Society, worked indefatigably at his collections, which are now in the hands of Mr. Thiselton Dyer; and Mahmoud, the Egyptian naturalist, who was sent out by the British Museum, has, I am told, made a very satisfactory collection of reptiles, a complete set of which will be presented to the Museum.

The PRESIDENT made the following remarks before the reading of the paper:—

I am sure the meeting will cordially welcome the return amongst us of Mr. and Mrs. Theodore Bent. It seems so short a time since they were here and since we bade them farewell, that it is difficult to believe they have gone through so many adventures, hardships, and perils, and have explored an almost unknown country to Europeans in the interval. I regret to say they have met with very serious and very wanton official obstruction at Aden, which very much increased their difficulties and also the danger of their undertaking. I will not detain you any longer, but will now request Mr. Bent to read us his communication.

After the reading of the paper the following discussion took place:—

Mr. THISELTON DYER: I cannot imagine that the Royal Geographical Society can often have listened to a more fascinating narrative of travel than that which has been laid before us to-night by Mr. Theodore Bent, and I think we must all have felt an agreeable kind of disillusion on hearing the account of what he had actually seen compared with what we thought before he started he might have to endure. I certainly for my part did not suppose that we should get such a glimpse as we have had of Oriental civilization as it seems to exist, with magnificent palaces and splendour, in the Hadramut valley. With regard to my interest in the result of Mr. Bent's journey, I shall not trouble you with more than a very few words. Of course, the geographer has to consider the world's surface from the point of view of its physical features and political divisions. The botanist, on the other hand, simply studies the vegetable productions of the soil and their relations in any one case to those of other areas which he has examined. I shall perhaps surprise you when I tell you that although undoubtedly in the geographical, and to a certain extent political, sense, Arabia belongs to Asia, yet if you study the vegetation, it is equally undoubtedly a part of Africa. It is a very extraordinary thing, and one which the scientific botanist has always felt some despair about, that, although Arabia confronts us at every point of the world's history, it is the one part of the world of which I may say at present we really, as far as natural history is concerned, know least. And even at the present time, although some amount of information has been obtained, it is almost entirely derived from the south-west corner, the province of Yemen. The botanical history of Arabia can be told almost in four words, beyond the little we read in the Bible about the myrrh and frankincense which former Phœnician commerce carried up the Red Sea and introduced into the Mediterranean. From that time until the end of the last century, we knew practically nothing more about the vegetable productions of this great peninsula. At that date an intrepid Dane, Forskal, spent some time in exploring the province of Yemen. He did admirable work, but unhappily left his bones in the country with which his name will ever be associated as the first botanical explorer. A hundred years later, Deflers, a Frenchman who had lived in Egypt, fired with enthusiasm to continue the work of Forskal, made an admirable collection; and that distinguished traveller so well known in this Society, Schweinfurth, also more recently visited the same country.* But you will see that these latter journeys were made upon the same portion of Arabia, and practically completed what Forskal had done. I should not forget that our own Indian officials have carefully examined the peculiar but very limited flora round Aden (from which about 200 species are known); but Mr. Bent is absolutely the first person who has brought us any information as to the remarkable productions of the valley he has described to-night. Now, as you have had your imagination stirred with a glimpse of one of the most mysterious aspects of Oriental life which, since the 'Arabian Nights,' has ever been brought before an audience, I can scarcely expect you to listen to details interesting to the botanist. But what Mr. Bent has found out amply confirms the deductions made from preceding researches. The fact is that the vegetation of Arabia is practically that of Somali Land and Abyssinia, with the same myrrh and frankincense trees in one country as in the other. I ought not to have forgotten that Professor Bailey Balfour laid before the Society an account of an expedition he made to the remarkable island of Socotra. We had hoped that Mr. Bent would have found some extension on the mainland of the remarkable plants found on that island, but that expectation is to a certain extent disappointed. Mr. Bent, however, found a dragon tree, nearly allied to that which exists in Socotra, which is the source of the cinnabar of the ancients, the red colouring matter called dragon's blood in modern times. I have not as yet a detailed account of the scientific work of the collector whom Mr. Bent was so kind as to allow to accompany him from Kew, but it will be published in due course. I do not know that I should be justified in detaining you any longer by going into details. Surgeon-Major Carter was the first man to make a careful study of the distribution of the frankincense tree about which we have heard so much to-night. It is a curious fact that there appear to be two districts in Southern Arabia, one to the south-west producing myrrh, and the other more towards the Oman country producing frankincense. As far as I can make out, and from what Mr. Bent has told me in conversation, the route taken must have been on the boundary-line of the two districts. Upon the exact marking out of these two districts, I believe some extremely interesting points in ancient commercial history will be found to depend, and when we have discussed the material brought back by the expedition, we shall, I hope, be able to add a chapter not uninteresting in itself to the supremely interesting work of the expedition.

The PRESIDENT: It remains for me to express your thanks to Mr. Theodore Bent for his admirable paper and his sketches, and to Mrs. Theodore Bent for her photographs, which together have given us a very clear idea of the country which was almost, if not quite, unknown to us. I have several times looked over the work of Halévy, and never been able to get any clear idea of the country from him. Of course, we have already the journey of General Miles, and my dear old friend Munzinger, afterwards murdered by the Gallas on the other side of the Red Sea, but their route was considerably to the westward and nearer the coast than that penetrated by Mr. and Mrs. Theodore Bent. You will all agree that they have done their work in a most admirable way, and brought back to us descriptions of a most romantic country of which we have only before heard rumours, and I hope you will allow me, and I am sure they will be glad, if I couple with them the name of the native surveyor from India, Imam Sharif, for the geographical work he did, above all for his great usefulness and helpfulness to Mr. and Mrs. Theodore Bent,

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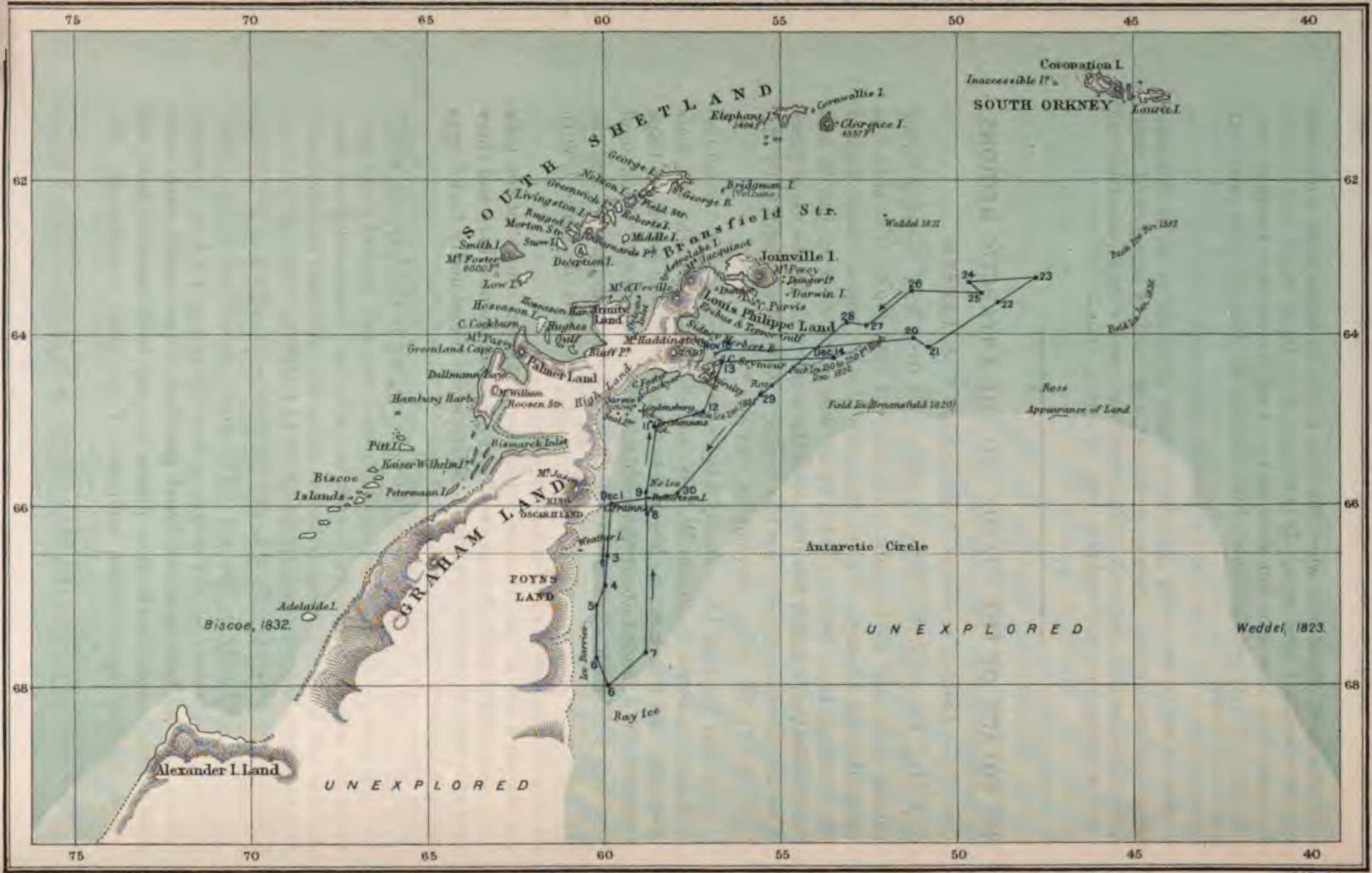
* Schweinfurth estimated the known plants of Yemen at 1500, of which three-fourths are also common to Abyssinia. He himself collected half of the species in the Italian colony of Eritrea, which he had previously collected in Arabia.

SKETCH CHART SHOWING CAPT. C. A. LARSEN'S TRACK IN THE JASON, 1893-94.



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in the absence of official help, which they had a right to expect from Aden, most improperly withheld from them. It is very much to Imam Sharif they owe not only what they have done, but their safety. I beg Mr. and Mrs. Theodore Bent will accept the very grateful thanks of this meeting for their admirable paper they have communicated to us.

MAP OF HADRAMUT.—The positions of many important places on this map, such as Mokalla, Hajarein, Shiham, and Sheher, were fixed by astronomical observations taken with a theodolite. The survey was made with a plane-table and prismatic compass, and the heights determined with an aneroid.

THE VOYAGE OF THE "JASON" TO THE ANTARCTIC REGIONS.

Abstract of Journal kept by Capt. C. A. LARSEN.

ON *Friday, November* 17 (1893), we had a gale from N.W., veering in the evening to W., and moderating. The sea was very high. The ship was kept under sail all day. No ice was seen in the places where we had been hunting seals before. The water was quite clear in the E. and towards Graham's Land, but the ice-fields seem to lie in the same place where we saw them during our last cruise. Position at midday, 64° 24′ S. lat., 55° 14′ W. long. Barometer, 743 mm.*

Saturday, November 18.—To-day a breeze with clear sky and sunshine. At 6 a.m. we began to steam W.N.W. and N.W., and caught ten seals (*Fiskesel*). At 5.30 p.m. we lowered two boats and went ashore on Cape Seymour. We landed about the middle part of the island. The second mate was sent with one boat to a little bay for reconnoitring; and the first mate with two men went in another direction inland; while I, with two other men, went in a third direction.

The land is hilly and intersected by deep valleys. Some of the hills are conical, and consist of sand, small gravel, and cement; here and there is some petrified wood. Upon the hilltops we occasionally found eggs of sea-birds.

We saw here a species of land-bird, belonging to the Rapaces, which resembles our hawk; it occasionally came down and pecked some eggs. When we were a quarter of a Norwegian mile from shore, and stood about 300 feet above the sea, the petrified wood became more and more frequent, and we took several specimens, which looked as if they were of deciduous trees; the bark and branches, as also the year-rings, were seen in the logs, which lay slantingly in the soil. The wood seemed not to have been thrown out of water; on the contrary, it could have never been in water, because, in the first case, we found petrified worms, while there were none in the second. At other places we saw balls made of sand and cement resting upon pillars composed of the same constituents. We collected some fifty of them, and they had the appearance of having been made by man's hand.

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* The ship's journal gives 74·3, which evidently means 743 mm.—TRANS. NOTE.

In one of the valleys we saw many dead seals, one of which was also almost petrified, while others seemed to have come only recently here; and there were corpses in which the fat still contained some streaks of blood.

We came to a spot where innumerable penguins had their resting-place. Their nests consisted of small shingle and birds' bones, of which there must be large quantities; occasionally eggs were lying in the open, but usually in nests, each of which contained two, or at the most three eggs. These eggs could be eaten baked, but not boiled, because the white would not harden; they were not very palatable.

We took with us samples of forest wood, some crystals and cemented stones. We also proposed to visit the spot where we had been during our first tour, but could not do so on account of darkness setting in when we were still several miles from it.

It seemed as if the island was of volcanic structure, because there was no snow either on the hills or in the valleys. The beach is flat, and consists of white sand.

On the eastern side of the island we found what appeared to be traces of a recent eruption. The land, elsewhere of a brown colour, was here black; and the surface and landward sides of the ice-field, which here lie probably on the ground, were also extremely dark.

"Joinville" may be considered as the opposite of "Seymour," because it, as well as the land in the west of Cape Seymour, which lies a couple of English miles off, in the Admiralty Inlet, is nearly all snow-covered.

In the S.W., Cockburn Island is all snow-covered, both the hills and the depressions, with the exception of a small bit of land in the S.E., which is probably a continuation of Cape Seymour—the inlet being hardly 2 or 3 fathoms deep. This space is covered with snow and ice, and is identical in structure with Cape Seymour.

The contrast at sunset, when the dark, naked land was thrown out against the snow-covered background, rising gradually to the summit of Mount Haddington at a height of 7050 feet, was very striking.

It was already night when we returned on board, and we set our course to the N.N.E., with the hope of finding seals to the N. of Danger Island. Barometer in the evening 744 mm.

Sunday, November 19.—Breeze from W.N.W. At night we steered N. by E., which course was maintained till 10 a.m., when we fell off to E. by N., and proceeded 10 miles (Norwegian) further. At midday we sighted Paulet Island. Only field ice was seen between here and Cape Seymour. We resolved to explore the ice in the east of this spot, where we had fished last year. Position at midday, 63° 48′ S. lat., 55° 10′ W. long., according to bearings to Paulet Island. Barometer, 739 mm. in the evening.

Monday, November 20.—Breeze from W.N.W. and N.W. Course changed at 10 o'clock to S. by E. We found ice just after midday, and sailed into a little bay, which we worked through, looking for seals; but not many were seen, and we caught only a few (*Graasel*). The ice was hard at its edge, but soft in several places in the bay. The ship was brought-to in a place cleared of soft ice. We were, at midday, in 64° 7′ S. lat., 51° 5′ W. long. The barometer predicted storms. Off the ice-rim the sea was high.

Tuesday, November 21.—Light breeze from W.S.W. At 4 o'clock in the morning we began to work towards the S. and S.S.E. till 9 a.m., when we turned towards N.N.E. and N.E. Some spouts of whales were seen amidst the floating ice. We have caught few seals, and the outlook is poor for hunting. At 4 p.m. we stood clear of the ice, and kept along its margin north-eastwards until 8 p.m., when we sailed into a little bay and stopped for the night. We were, at midday, in 64° 21′ S. lat., 50° 59′ W. long. Barometer in the evening, 745 mm.

Wednesday, November 22.—Breeze from the W.N.W. increased to a storm from the S.S.W. in the evening, with snow and great cold. At 4 a.m. we began sailing N.N.E. along the ice-margin till 5.30 p.m., when we brought the ship into a small bay, where we lay for the night. We saw a number of blue whales (*Blaathvalen*) and grampus along the ice-margin. The ice is very hard packed here on account of the winds from the W. which have blown these last days with a heavy sea against the ice; so nothing can be expected before the wind changes to the S. or S.S.E., which wind will carry the ice away from the places which are good fishing-grounds. We found last year that those grounds were rich in seals where there were plenty of small fishes and shrimps, and in these places we then met with a large quantity of that kind of food. We were, at midday, in 63° 41′ S. lat., 45° 52′ W. long. Barometer, 751 mm.

Thursday, November 23.—Breeze, with snow and fog, from S.W., which continued till after midday. We worked into the ice, but as it was very packed, and no seals were to be seen, we came out and set sail, steering N. from 6 till 10 p.m., when we sailed W.S.W. Position at midday, 63° 22′ S. lat., 47° 32′ W. long. Barometer, 755 mm.

Friday, November 24.—Wind from W.N.W. and W.S.W., with snow and fog. Sailed westwards till 6 p.m., when we took a N.W. course. Nothing to report, in consequence of snow and fog. Position at midday, 63° 29′ S. lat., 49° 37′ W. long. Barometer, 753 mm.

Saturday, November 25.—Fresh wind from S.W. till midday. We went S.S.E. till 1 p.m., when we took in sail and steamed westwards along the ice-margin. The ice lies as before, so there is nothing to expect. We saw hardly any seals. In the evening there was a light breeze from the N.; so we made all sail westwards along the ice-margin. Position at midday, 63° 35′ S. lat., 49° 20′ W. long. Barometer in the evening, 751 mm.; fog.

Sunday, November 26.—Breeze from W. and W.N.W., with fog. The ship was several times under sail. We saw some whales (*Finkwale*) and birds. Very heavy sea, and we have passed by many ice-fields. Position at midday, 63° 22′ S. lat., 51° 18′ W. long. Barometer, 750 mm.

Monday, November 27.—The wind has changed to N. and N.E., light in force, and a thick fog is lying. We were within a bay made by an ice promontory, and came out of it at 7 o'clock (after having taken a sea-leopard), because the ice here also was thickly packed to its margin. We have had a boat out for hunting a whale (*Knarkval*), but lost sight of it on account of the thick fog. It appeared, however, that there was abundant food for the seals, and many whales and sea-birds were seen. At midday we were in 63° 59′ S. lat., 52° 32′ W. long. Barometer in the evening, 753 mm.

Tuesday, November 29.—Breeze from the N. and N.W., with very thick fog. We sailed towards the S.W. till 4 o'clock, after which we sailed close-hauled on the starboard tack. In the evening the fog partly cleared. Many ice-fields were passed to-day; the ice is in parts quite packed, and was drifting eastwards. Position at midday, 63° 56′ S. lat., 53° 8′ W. long. Barometer, 751 mm.

Wednesday, November 29.—We had to-day a fresh breeze from the W., and sailed close-hauled. A number of ice-fields were passed, from 200 to 250 feet high, and sometimes 10 English miles long, but scarcely any small ice was to be seen. At 5 o'clock we passed an ice-ledge, upon which there were seals, while some whales (*Finkvale*) were swimming round it. At 6 o'clock we had cleared the big ice-fields, and saw open water towards the S. as far as the eye could see from the masthead. We have been all the day long in sight of Graham's Land, and had fine weather.

As we had thus explored the ice E. and W., and found that there was nothing to expect so long as the ice should remain in the same condition, we thought it would be best to push southwards close to the land, in the hope of finding whales (*Rethvalen*), as there was so much open water behind the ice-fields. At midday we were in 64° 50′ S. lat., 55° 33′ W. long. Barometer, 751 mm. in the evening; fine weather.

Thursday, November 30.—Wind changing from N.W. to N. and E., with light breezes, fine weather, sunshine, and much warmth. We steered S.W. till 1 o'clock, then W.S.W., passing very few ice-fields on the way, and no small ice of any importance. At 10 p.m. we saw through the fog a dark mass, which we supposed to be the land, and also here and there in the water some seals. Hove-to for the night. Position at midday, 65° 57′ S. lat., 58° 0′ W. long. Barometer, 741 mm., slightly falling, in the evening.

Friday, December 1.—Fresh S. wind, with some snow and fog. At 4 a.m. we turned the ship off the ice, and heard at the same time the spout of a whale, but on account of the fog I could not say what whale it was. At 6 o'clock it finally cleared, and we lowered our boats, six in number, which were sent to a low ice-rim in a small land bay, where great numbers of seals were lying. However, most of them were far on the ice, which was covered with deep snow, so that the boats could only catch the seals along the borders; they, however, killed one hundred and twenty-five (*Fiskesel*), very big and fat. The land which we saw to the W. and S. of us was named King Oscar II.'s Land. It appeared to be a high land covered with snow and ice, stretching southwards and northwards, with many high snow-covered peaks in the interior. Here and there it was free of snow, and showed its grey slopes. Looking from the sea, it appeared most interesting for scientific exploration, as there were immense glaciers, which reached nearly to the sea, and I suppose that it would be easy to climb over them, with snow-shoes. The first mate and myself walked over towards them. How interesting it would have been to explore that land! but, as we were not sent out for scientific exploration, but for whale and seal hunting, we had to resist the temptation. We gave the name of Mount Jason to a high peak which rose in the east of that highland; and to the promontory which shoots off in an eastern direction from Mount Jason, we gave the name of Cape Framnes. It appeared, in fact, to be the most advanced point of the land which we saw here.

Mount Jason is very free of snow in its lower parts. The land to the N. of it seemed to be more even, with gently rising fjeld-ridges. Round Mount Jason and Cape Framnes, on the contrary, it is very uneven and broken by ravines. A fjord, filled with ice, runs inland, to the N. of Cape Framnes, in a westerly direction. A high barrier of ice stretches from the fjord northwards and slightly eastwards. This barrier is very high in some places, and seemed to stretch from the fjelds towards the sea, apparently covering also the lowland, since it protruded for 5 or 6 English miles into the sea. The ship was about 3 English miles E. off the nearest shore of Cape Framnes.

So far as we could see, the mainland runs somewhat W. of N. (N.N.W.) to E. of S. (S.S.E.), and has many indentations; to W.S.W. of us, it had a very high mountain, whose slopes were mostly snow-clad.

We saw here five or six species of sea-birds. The current is flowing N.N.E., at a speed of 1 mile. We have had remarkably fine weather and light winds. Position at midday, 66° 4′ S. lat, 59° 49′ W. long. Barometer in the evening, 743, rising.

Saturday, December 2.—Light breeze from N.W. to N.E. all day, with clear atmosphere, fine weather, and sunshine. We steamed northwards along the ice-barrier, looking for an opening inwards into the land; but so far as I could see from the masthead, the ice-barrier stretched straight along the coast; so we returned to the ground of the previous day, and caught ninety seals. There was a great number of seals on the solid ice, and we sent a party to see whether it would be worth catching them on the ice, and dragging them to the boats; but this proved to be impossible, on account of the deep snow, into which the men fell. The ice also was very insecure in many places, as it was rotting from beneath by the current, and from above by the salt.

In the evening we saw in the water some small fishes with big eyes and a bright skin; also a lot of birds. At 8 p.m. we began cruising along the barrier, and saw several small whales which we supposed to be *Minkeval;* they moved southwards. Barometer, 747 mm.

Sunday, December 3.—Light breeze from N.E., with haze. We kept sailing all night along the ice-barrier, first S.E. and then S. The barrier proved to be here much higher than in the N. of Cape Framnes, and there were deep indenting fjords, partly covered with thin ice, upon which seals were lying in great numbers. The ice-cliffs were here overhanging and crevassed, and immense blocks fell from them into the sea with deafening noise, so that great caution had to be exercised not to approach too near the barrier. We caught a few seals (*Graasel* and *Fiskesel*) which were lying upon the lower ice; they were very fat. Behind the ice-barrier the land appears even and snow-clad; it stretches in a southern direction. There must be ground under the ice-barrier, because in some places it stretches far into the sea. We caught to-day ninety-six seals. Position at midday, 66° 42′ S. lat., 59° 59′ W. long. Barometer in the evening, 749 mm.

Monday, December 4.—Breeze from the N.E., with mist. We lay off the ice-barrier under sail, and saw many seals, but could not go on hunting, as the sea was too high. Round the spot where we are now there are many long fjords, stretching through the ice-barrier; we could not see their heads. Some of them are very wide at their mouths; inside they are covered with small ice. The ice-cliffs on both sides of these fjords were much overhanging, so that if there were seals we could not have tried to catch them. The emperor penguins (*Kongepenguinerne*) were very numerous in those fjords. Position at midday, 67° 0′ S. lat., 60° 0′ W. long. Barometer, 747 mm.

Tuesday, December 5.—Since yesterday we have had a N.E. breeze until 4 a.m., when the wind fell, and it began to snow. We steamed southwards. At 12.30 we saw a whale spout, but could not ascertain the species. At 2.30 the mate saw three more spouts, and he could only ascertain that one was from a *Rethval;* he took a boat and rowed to the spot, but did not see the whale again, although he remained out for two hours. At 8.30 another spout was seen, but too far from us. We sailed along the ice-barrier. Position at midday, 67° 13′ S. lat., 60° 16′ W. long. Barometer, 746 mm.

Wednesday, December 6.—Light breeze from the W. with snow till 11 a.m., when it cleared. We began to steam along the ice-barrier, first S.E. to E. till 1 o'clock, when, the barrier going more to the S., we steered S.S.E. and S. by E. till 6 p.m. Our southward progress along the coast was then stopped by winter ice, which in some places was frozen hard together, and broken by crevasses, with smaller ice-fields lying between. These were very uneven, and looked as if they had been pressed during the winter by the drift of ice against the barrier. Bay-ice stretched north-eastwards towards a promontory.

Our most southern spot was reached this afternoon at 6 o'clock, in 68° 10′ S. lat. To the westward land seemed to rise quite evenly from the sea, to a considerable height, and, so far as I could see from the masthead, it stretched further S., with bay-ice and occasional ice-fields along its coast. From the ice-barrier, which stretches along the land from S. to N., originate most of the flat ice-fields, which drift to the eastwards of spaces on the E. of Graham's Land and Danger Islands, as also between the Shetland and the Orkney Islands, approaching nearer to the latter on account of the currents.

The weather here, in the S., was much better, with less cold, fog, and snow than it was further N. We saw some gulls and penguins.

Position of ship at midday, 67° 50′ S. lat., 59° 59′ W. long. Barometer in the evening, 748 mm.

Thursday, December 7.—Fresh breeze from N.E. We have followed the eastern side of the barrier since yesterday evening. The ice stretches N.N.E. and more to the E. At 5 p.m. we saw an ice-promontory in the N.N.W., and cleared it at 7.30, because it turned towards the E. If we had kept longer in the bay, and if the wind had begun to blow from the E., we should have run the risk of being frozen in, as the ice-promontory would have turned and been pressed against the ice-barrier.

The weather was colder to-day, with some snow. We passed by several ice-fields. At the low ice-promontory we saw numbers of gulls in the water. They were of the same species as those of the Arctic Ocean, named *Graamaage*, or Havhest. Position at midday, 67° 45′ S. lat., 58° 56′ W. long. Barometer, 749 mm.

Friday, December 8.—Gentle breeze from the N.E., with a thick fog. We steered N.N.W. All sails set at 2 a.m., and the engines were stopped, as the fog was very thick. At 2 p.m. we began going N.E. to look for seals near the land, where we had previously hunted them. We began cruising at 7 p.m., as a strong breeze came from the N.E., and the sea was high, even near to the ice-barrier. Position at midday, 66° 12′ S. lat., 58° 46′ W. long. Barometer, 738 mm.; fog and rain.

Saturday, December 9.—Wind in the morning, falling to a light breeze from N.E. We made towards the ice, under steam, and, when we came to the ice-rim, we saw a few seals, but we could lower no boats on account of the heavy sea. The high mainland was now seen distinctly. An island was well seen to the W.S.W. of Cape Framnes, and we named it Weather Island (*Veier Öen*); it lies a good deal off the land

On the mainland, S.W. from Weather Island, are four hills, which are free of snow on their northern and eastern slopes. These heights were named by us Foyn's Land. From their N.W. end, near to an indentation of the coast, begins a ridge, which stretches north-eastwards till it meets with the lowland near Mount Jason.

Foyn's Land is a very conspicuous landmark, especially when approached from the N. along the edge of the ice. The sides and summits of the four hills can then be seen as they slope gently southwards from the ridge to the snow-covered ground.

We went northwards along the ice-barrier under steam against a light breeze from N., and under all sail when the wind came from the S.E.; the weather bright and sunny. An immense number of birds, of large and small size, were sitting on the ice-cliffs. The ice-barrier trends here very evenly northwards, with small bays here and there. Towards the evening we passed an island which was very free from ice and snow, and we named it Robertson Island. It stretches from S. to N., and halfway trends N.W. It has its highest part in the S., while at its northern extremity the land is low, and it was mostly free of snow. It was possible to approach pretty close to it, the more so as there was a bay in the ice which descended to the beach. We saw here a blue whale (*Blaahval*); but after hunting it for some time, we lost it. Position at midday, 65° 57′ S. lat., 58° 53′ W. long. Barometer in the evening, 733 mm.

Sunday, December 10.—Breeze with snow and thick fog all day. We cruised up and down along Robertson Island and to the edge of the barrier. The ship drifted close to the ice-rim of the island, so that we could make headway even against the wind, till 2 p.m., when the current drove us towards the land. We kept about 3 miles off the island, where there were drifting ice-fields. The wind abated towards the evening, but the sea was pretty high. The current has here a speed of about 2 miles in a N.W. direction. Position at midday, 65° 18′ S. lat., 58° 20′ W. long. Barometer, 738 mm., rising.

Monday, December 11.—Wind turning from N.E. to S. and S.W., with snow and occasionally clear weather. We steered towards a little volcanic island, situated to N.W. of Robertson Island. It was in full activity. We named it Christensen Volcano. A small sound running W.N.W., which is quite narrow in the middle part of Christensen Island, and again widens on the other side, separates it from Robertson Island. We landed with three boats on the ice-rim of Christensen Island. The first mate and myself went on the ice, which was 5 to 6 feet high, but much lower in places. The rest of the crew had to begin later on catching seals. We put on our snow-shoes and went inland. From the masthead of the ship I had seen a large herd of seals which extended from Robertson Island along the whole length of Christensen Island, lying near to the margin of the ice, in a great curve, as far as a small volcanic island situated N.W. of Christensen island. This volcano had the shape of a sugar-loaf and was of considerable height. The ice was melted for a considerable distance around it. It presented a remarkable aspect, as round the top and on the slopes there were funnel-like holes, from which a very black and thick smoke issued from time to time, covering the top itself. In short, it was in full activity.

We went on Christensen Island a distance of about 4 English miles from the ice-rim; but the route was hard, as we had to work through a deep and wet snow which went into our snow-shoes, and we also had to take a circular route in order to avoid places where there was much water, sometimes forming large streams. When we were nearly halfway to the middle of the island, we found an obstacle in a crevasse nearly 10 feet wide, which we had to follow till we saw a snow bridge which crossed it, leaving a rent nearly half a fathom wide near to its other side. As the first mate was anxious to approach the herd of seals, we crossed it, not without some difficulty, and directed our steps to the densest part of the herd of seals. On the way, we found, at a distance of about 1 English mile, a great number of volcanic stones, which must have been thrown out recently. The ice becoming harder, and very uneven—since it had melted away in places after the volcanic eruption—we took our snow-shoes off. The seals lay in places so closely packed that we had to make circles in order to advance. It was a delightful sight to see those masses of animals, most of which proved to be youngsters of the *Fiskesel*, which already had changed hair; they were beautifully fed, and looked like so many balls. Here and there an old animal was amidst the youngsters. The seals were not a bit afraid of us; on the contrary, they stretched their flippers towards us as we pelted them. There were many openings in the ice, due to the current which runs towards the land, and to the heating of water by all these volcanic eruptions.

There must have been here abundant food for the seals, as the ice was everywhere strewn with fishes and fish-bones. When I opened the stomachs of the seals, I saw them filled with a fish which has a white flesh, and which we call at home *Kvitting* (whiting), and also with sharp bones.

As these seals were lying too far from the water, and the snow was too deep for the men to work, we left them untouched.

Christensen Island was mostly free of snow, of which there is only a little on the N.W. and S. sides; in the middle part, and all along the way to the top, there was no snow whatever. About the middle of the eastern side of the island there is a mass of stone *débris*, which extends from the beach to the middle of the island. The slopes of the island are pretty steep in this place, but gentle towards its ends.

On our return journey we found the snow bridge in the same state as before, and we reached our boats without further adventures, only very fatigued, as snow had fallen while we were in the middle of the island. The crew had caught twenty-eight seals.

To W. by N. from Christensen Volcano there are—in a straight line, so far as we could see—five islands, which we named Seal Islands (*Sel Öerne*). The one which lies most to the S.E. is very high, and has its highest spot on its S.E. end; the second island is quite low, and has no spot which would attract attention; the third is high again, and has its summit to the east of its centre; the fourth is also high, and has its highest spot on the eastern end, while its length attains nearly 3 Norwegian miles. The channel between the third and the fourth islands is nearly twice as wide as between the second and the third. The distance between the fourth and the fifth is greater than this last, and it turns a little more to the N.W. than the first-named sound. The fifth island of the group is also much lower than the fourth, and has no prominent features. All these islands are free from snow, so that they are probably of volcanic origin, the more so as all tops of mountains on the mainland are snow-clad.

The ice between all these islands is flat and low. In the W. of Cape Foster, and also off this range of islands, the ice is quite low, and, so far as I could see in fine weather, there is no land to be detected to the N. and N.E. of Lindenberg Volcano. I saw several elevations amid the ice, which I think must be low rocky islands (*Skjær*), not high enough to rise above the ice; they are either quite flat, or may rise some 5 feet above the surface of the water. These rocks do not extend more than 3 to 4 English miles to the N.E. from Lindenberg Volcano.

In the evening of the same day, after we had steered N.N.E. and E.N.E., we sighted Cape Foster. Position at midday, 65° 7′ S. lat., 58° 20′ E. long. Barometer in the evening, 744 mm.

The approximate positions of these islands, measured relatively to the middle point of Weather Island (*Veier Öen*), which lies in 66° 26′ S. lat., 60° 45′ W. long., is as follows:—

Top of Mount Jason	65° 44′ S.	60° 45′ W.
Northern extremity of Foyn's Land	66° 42′	61° 50′
S. Point of Cape Framnes	66° 5′	60° 37′
N. and E. point of same	65° 43′ (?)	56° 57′ (?)
Highest top of Robertson Island	65° 50′	58° 47′
Christensen Volcano, highest spot	65° 5′	58° 40′
Middle of Lindenberg's sugar-top	64° 50′	59° 0′
The South-eastern Seal Island, highest spot	65° 5′	59° 11′
Seal island, No. 2, middle	65° 1′	59° 23′
" No. 3, "	64° 59′	69° 34′
" No. 4, "	64° 53′	59° 52′
" No. 5, "	64° 45′	60° 8′

All these are given according to the ship's dead reckoning, as accurately as possible.

The journey was continued therefrom till December 16, when Danger

Islands were passed, as well as Joinville, where we saw a rock or cliff, about 30 feet high, whose position was ascertained with an altitude and by means of bearings on the land to be as follows: 63° 5′ S. lat., 55° 18′ W. long., 15 English miles from Joinville. On the north side of the same there are also several reefs, showing above water for about 2 English miles from shore.

From here we continued the voyage between Graham and Shetland Islands to Middle Island. The fog being too thick to continue westwards, we decided to abandon our idea of entering the Shetlands archipelago. In the fog we touched land on the southern extremity of Greenwich Island. We therefore made the narrow strait between Greenwich and Livingstone islands. I have been inland as far as the middle of the former island, which was mostly covered with snow; but in the middle of its southern end, where it was flat, there was in places no snow, and the soil was covered with moss; a few seals were seen on the beach. There is here a promontory, which runs southwards, etc. The north part of the island, which attains a height of about 100 feet at its edge, is covered with snow. At the north end a row of rocks stretch in a north-westerly direction to about the middle of the channel; the navigable passage in the eastern part is quite narrow, with sunken rocks on both sides.

We kept the high steep islands on our starboard, and found a few rocks (*Skjær*) at the mouth of the channel; then we kept the next island to port, as there was no passage to the W. of it. We kept next under a little vertical rock which rises like a pillar from the sea, leaving it to starboard. To N.W. we saw an island, rising vertically from the water on all sides except the southern, where it slopes more gradually. It attains a height of 1600 feet, and looks like an augitic stone, flat on the top, and covered with moss.

All the rocks and small islands were kept on starboard except one group of one larger island and five small ones, which we had on our port side. On keeping exactly in the midst of the described water, one gets clear of all of them. Once the high cliff just mentioned is passed, the water is free. It must be remarked that on the map few only of these islands are marked. We gave the above inlet the name of Norway Sound (*Norske Sund*).

On Livingstone Island there are many good beaches and bays. The stone pillars seem as if they had been made by man's hand, and rise high upon the cliffs near the beach.

From here the journey was continued without any hindrance. We went to the coasts of Chili, to see if we could not find some whales, but as we saw none, we went to Port Stanley, to get rid of the seals we had captured, and take coal for a new journey southwards.

We passed then between Clarents Island and Elephant Island towards Joinville, passing off the inside of these islands, and taking the direction of Mount Percy. The most northern of the Danger Islands nearest to Joinville lies more southwards than is shown on the map, as it is very little north of the line of the other islands.

We then proceeded to Paulet Island, which appears to be marked correctly on the old map, and passed between this island and Cape Purvis. There are shoals a little off Paulet Island, so that ships with deep draught cannot approach it from the N. side. Paulet Island was once an active volcano. It was quite clear of snow, and had, a little way from the top, a terrace upon which thousands of penguins were sitting; large spaces underneath the terrace and northwards were also without snow, as well as a beach which attained a great width, and had a little lake upon it. All this flat part was covered with penguins, and many seals, which we hunted, were also lying on the sandy beach. The northern side of the island has a striking appearance, on account of its steep red cliffs, which rise from the water, and are seen from a great distance, the red showing very well on the grey background which formed the rest of the island as we saw it on January 23, 1894.

From there we went into Erebus and Terror Gulf, where we found some drift-ice, and hunted for seals for two days. On January 26 we sailed eastwards almost in the line of continuation of Danger Islands, where we found ice in almost the same position as in 1892. Here we continued hunting, and drifting in a northern direction towards Joinville. On March 8 we lowered the boats for the last time, in 64° 27′ S. lat., 58° 55′ W. long. On March 10 we encountered a raging storm, with great cold and thick snowfall, so that the ship was quite covered with ice.

We reached Falkland on March 15.

PHYSICAL CONDITIONS OF THE CLYDE SEA AREA.

By HUGH ROBERT MILL, D.Sc., F.R.S.E.

The name "Clyde Sea Area" is applied to the waters of the south-west of Scotland, loosely known as the Firth and Lochs of the Clyde, lying between 55° 5′ and 56° 17′ N. latitude, and between 4° 30′ and 5° 40′ W. longitude. This connected water-area lying to the north of a line drawn from the Mull of Cantyre to the Rinns of Galloway measures 1160 square miles, and has an average depth of 29 fathoms, the total volume of water in it at low tide being 25·54 cubic sea-miles, with an addition of 1·15 cubic sea-miles at high tide. The Clyde Sea Area is a distinct natural region, although on the surface it is continuous with the Irish Channel. This channel communicates freely with the Atlantic, north of Ireland, the average depth being greater than 60 fathoms; but across the entrance to the Clyde Sea Area there is a broad expanse of very shallow water covering a shoal known as the Great Plateau, the depth over the shallowest part of which is only 21 fathoms. Ailsa Craig, a small islet of volcanic rock, rises from the crest of this plateau, and the northern edge of the plateau reaches to the large island of Arran. The bed of the

Sea Area north of the plateau sinks into two depressions, one running along either side of Arran; these unite at the north of that island, and the deep water terminates near Ardrishaig. This region I term the Arran Basin. At its northern extremity it is prolonged north-eastwards in Loch Fyne, a narrow and comparatively deep fjord, barred off by two shoals which cross it from shore to shore, but continuous so far as its surface is concerned. The Arran Basin also communicates eastward with a long stretch of comparatively deep water, which I term the Dunoon Basin. This is joined from the east by the shallow estuary of the Clyde; and to the north a series of fjords, Loch Strivan, the Holy Loch, Loch Goil, Loch Long, and the Gareloch, branch into the mountainous region toward the direction of Loch Fyne. Each of these natural divisions has a character in some respects peculiar to itself, but for general purposes it is sufficient to consider one example of each of the chief types. Accordingly, we select the *Channel* outside the Clyde Sea Area, the *Arran Basin*, *Loch Goil*, and the *Gareloch* as examples.

Table I. contains the more important statistics regarding them.

TABLE I.—TYPICAL DIVISIONS OF THE CLYDE SEA AREA.

Name.	Length.	Area, sq. sea-miles.	Depth low water, fathoms.		Volume, cub. sea-miles.		Average salinity.	
			Average.	Max.	Low water.	Tidal Increment.	Total salt %	% Sea water.
Arran Basin ...	50	531·00	34	107	18·037	0·690	3·360	96·0
Loch Goil	5	2·61	14	47	0·037	0·004	3·230	92·3
Gareloch	5	3·28	7½	24	0·024	0·005	3·136	89·6

The deep water of the Arran Basin is separated from the deep water of the Irish Channel by the mass of the Great Plateau. The Dunoon Basin is similarly though less completely barred off from the Arran Basin; Loch Goil is much more effectually barred off from the Dunoon Basin, the bar at its mouth rising to within 8 fathoms of the surface, while the deepest water inside is 47 fathoms. Thus each of these divisions is more restricted as regards communication with the open sea than the one before, and each is in a similar ratio more exposed to the influence of the surrounding land. In the case of the Gareloch opening off the shallow estuary, and consequently filled with water of much less salinity than the other divisions, the isolation from marine influence comes to a maximum.

The usual rise of water-level from low tide to high tide is about 1½ fathom, and the tidal current rarely exceeds about 2 miles per hour, except in the Channel off the Mull of Cantyre, and at the narrow and shallow entrances to the lochs, where the stream at flood and ebb is sometimes as rapid as 6 or 7 miles per hour. The hour of high water is practically the same for the whole Area.

The observations on which this paper is founded were carried out for the Scottish Marine Station by Dr. John Murray, of the *Challenger* Expedition, and the author on the steam-yacht *Medusa*, which is specially equipped for such work, between 1886 and 1889. They included observations of temperature at all depths, and of density at surface, bottom, and occasionally at intermediate positions repeated at intervals of a month or longer at 70 stations distributed over the Area.

The first and second portions of the complete discussion of the work, entitled "Physical Geography" and "Salinity and Chemical Composition of the Water," were published in the *Transactions* of the Royal Society of Edinburgh, vol. xxxvi. Part III. No. 23, 1891; and the third and much larger part, dealing with

"Temperature," is published in vol. xxxvii. of the same publication. This paper deals only with the general conclusions of the temperature discussions.

The climate of the Clyde Sea Area is mild and equable The average annual temperature of the air is 47·3° Fahr., the extreme mean monthly temperatures being 39·4° for December and January, and 57·8° for July and August, a range of 18·4°. The years under observation were on the whole slightly colder than the average. The prevailing wind is south-westerly, although the direction is much altered by the configuration of the land, having a tendency to blow along the fjords, either up or down. Rainfall is heavy; in the landward portion amongst the rugged hills of the Highlands and over the narrow lochs the annual precipitation averages 56 inches, while over the lower land and wider water-surfaces of the seaward portion it averages 43 inches. The rainiest months are also the coldest, January and December, the average for each of which is 6 inches; while the driest month is May, with an average precipitation of only 2·5 inches. During the years under consideration the rainfall was nearly 10 inches per annum less than its average value. The density of the water varied with the rainfall, and the average value of the salinity in percentage of total salts to the mass of the water for the three representative divisions is given in Table I. There is also added the proportion of pure sea-water present on the average in each division, taking as "pure sea-water" that containing 3·5 per cent. of salts.

The temperature *régime* of the Channel must be considered in relation to that of the Clyde Sea Area, for it supplies the water which enters the system at every flood tide. The thermal peculiarity of the channel is that at any given time the temperature from surface to bottom is practically the same, a condition which I call *homothermic*. Since heating or cooling by radiation tends to produce a stratification of still water according to temperature, or a *heterothermic* condition, in which the surface water most readily responds to seasonal changes, it follows that where homothermic conditions prevail in summer and winter alike, the result must be brought about by continuous mixture of the water in a vertical sense. This is produced in the Channel by the strong tidal currents and the extremely irregular character of the bottom, which causes the deeper water to rise and mix thoroughly with the upper layers. As the season advanced, from the annual minimums of sea-temperature in March the whole depth of water in the Channel heated up steadily and uniformly, the deepest layers growing warm as rapidly as the surface, and after the maximum in September, the temperature fell simultaneously through the whole depth of the water, the temperature curves in all cases being straight lines.

The Arran Basin communicates with the Channel by slices of water carried to and fro by the tides across the Great Plateau. At the time of minimum temperature the water is homothermic, and has practically the same temperature as that in the Channel; but it heats up most rapidly on the surface and more slowly at great depths. The lower layers change their temperature homothermically, but as the rate of heating increases with the advance of summer, the depth of homothermic water diminishes, until at the maximum it usually disappears, and there is a fall of temperature from surface to bottom. During cooling the water changes its temperature with almost equal rapidity at all depths, and at the bottom the period of cooling from the maximum to the minimum is only one-third as long as the period of heating from the minimum to the maximum. This greater rapidity of cooling is due to the establishment of downward convection as soon as the chilling of the upper layers equalizes the density *in situ* of the surface water and that of the slightly more saline water below.

During cooling the surface remains colder than the deeper layers, but the range of temperature between surface and bottom is always much smaller during cooling than during heating.

Loch Goil, much more isolated than the Arran Basin from oceanic influence, shows all the characteristics which distinguish the Arran Basin from the Channel, but in an exaggerated degree. At the annual minimum in early spring the mass of water is homothermic, and practically at the same temperature as in all other parts of the Area, but the surface alone heats up rapidly as the season advances. The mass of water below the level of the bar heats very slowly, and only to a slight extent. It was evident that heat from the surface-layers was transmitted downwards mainly by the slow process of conduction, the maximum temperature at the bottom being reached in early spring, nearly six months after the date of the surface maximum, and only a month or two before the minimum temperature reasserted itself from top to bottom. The vertical distribution of temperature is thus subject to remarkable changes. The curve of the minimum is homothermic as elsewhere, the curve of heating shows a great range of temperature, and when cooling sets in its upper part is reversed in direction.

The cold of winter may have reduced the upper layers of water to 34° or less, while the heat of the previous summer is still being conducted downwards, and the water remains warmest in the centre and colder both above and below.

The Gareloch, although of nearly the same superficial area as Loch Goil, is only half as deep, and shows very clearly the effect of its land surroundings in the rapid heating and cooling of its water. The curves representing the vertical distribution of temperature are of four types corresponding to the seasons. The typical conditions at both minimum and maximum are homothermic; during heating the surface water is much hotter than that beneath, and while cooling is in progress the surface is correspondingly colder. The maximum temperature of the water was higher, the minimum lower, and the rate of gain and loss of heat more rapid than in any of the other divisions of the Clyde Sea Area. It was found that the seasonal march of temperature-change was very irregular, each of the three years during which observations were fairly complete showing very conspicuous irregularities. These were largely due to the action of wind in producing vertical circulation in the deep basins. Thus when a strong wind had been blowing up one of the lochs in summer, from the mouth towards the head, a great accumulation of the warm fresh water skimmed from the surface accumulated at the head of the loch, while upwelling of the deeper and colder water occurred near the mouth. Similarly, if a strong wind had been blowing down the loch, from the head toward the mouth, the warm and fresh water was found extending to a considerable depth near the mouth, while at the head the intensely salt and cool water from below was welling up on the surface. This circulation sometimes appeared to extend through the whole depth of a basin, but more frequently it was confined to the upper layers, and its nature, as indicated by the direction of the isotherms drawn on an exaggerated profile of the loch-basin, was curiously complicated.

The general seasonal changes of temperature are given in Table II., which is deduced from curves which were drawn in such a way as to eliminate local disturbances as far as possible. This table applies to 1887, a typical year with a summer somewhat hotter and drier than the average. The temperature of the air is an average for that over the whole Clyde Sea Area, the local readings being somewhat various. The temperature of the upper 5 fathoms shows a fairly close agreement in all parts, the Gareloch and Loch Goil being almost identical, and the yearly mean for the whole being practically the same. It is interesting to observe that the annual mean temperature of the upper 5 fathoms of water is 1·8° higher than the annual mean temperature of the air at the surface, and that thus the water on the whole exercises not only a moderating, but an elevating influence on air-temperature. The mean temperature of the surface is greatest for the open sea and least for the narrow land-locked lochs; indeed, it was a fact constantly observed that the water was warmed from the ocean inwards.

TABLE II.—MONTHLY MEAN TEMPERATURE FOR 1887, OF AIR AND WATER IN THE CLYDE SEA AREA.

Division.	Jan.	Feb.	Mar.	Apl.	May.	Jun.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Year.
AIR (MEAN)	39·1	40·6	39·4	43·0	49·9	58·6	59·8	57·2	52·6	45·4	41·3	37·6	47·0
WATER, SURFACE LAYER OF 5 FMS.—													
Channel	47·2	44·6	44·1	44·8	46·0	48·4	51·6	55·3	55·9	54·0	51·4	48·2	49·3
Arran Basin	44·2	42·9	42·9	45·2	48·0	51·8	54·4	55·2	55·2	53·8	50·8	47·0	49·3
Loch Goil	43·6	42·1	42·7	45·1	48·1	51·0	55·0	57·5	55·6	51·8	48·2	46·3	48·9
Gareloch	42·8	42·3	42·4	44·2	47·3	52·0	56·8	58·0	55·6	51·5	47·2	44·8	48·7
WHOLE MASS OF WATER—													
Channel	47·2	44·6	44·1	44·8	46·0	48·4	51·6	55·3	55·9	54·0	51·4	48·2	49·3
Arran Basin	44·5	43·7	43·5	44·4	46·2	48·4	50·2	52·9	52·1	50·4	48·5	46·3	47·5
Loch Goil	46·0	44·8	43·9	44·2	45·2	47·3	50·0	52·7	52·8	51·1	49·4	47·9	47·9
Gareloch	43·2	42·6	42·8	44·1	46·8	51·2	56·0	58·0	56·0	51·2	47·4	45·5	48·7

Table III. shows that the air was warmer than the surface layer of water for a shorter time over the Channel and in the Gareloch than over the deep lochs or basins, while the annual maximum of surface-temperature was retarded 42 days in the shallow Gareloch, 47 days in the more oceanic divisions, and 54 days in Loch Goil, after the date of air maximum. The curves of annual variations of air and water temperature showed that the retardation of phase in the curve of water-temperature was determined by the fact that the descending curve of air-temperature always cut the curve of water-temperature at its maximum. Thus when the water heated rapidly owing to a hot summer, its maximum occurred shortly after that of the air, because a short time of cooling brought the air down to the temperature of the water, and stopped further heating. On the contrary, when the water heated up slowly to a low maximum, there was a much longer retardation on account of the time which the air required to cool down to the temperature of the slowly warming water.

TABLE III.—RELATION OF AIR AND WATER TEMPERATURE IN THE CLYDE SEA AREA (MEAN OF 1886 AND 1887).

	Air.	Channel.	Arran Basin.	Loch Goil.	Gareloch.
Excess of surface water over local air-temperature (mean annual)	—	1·7°	1·7°	1·8°	1·9°
Days air warmer than surface	—	134	136	138	124
„ cooler „ „	—	237	228	236	248
Retardation of surface maximum after air maximum, days	—	47	47	54	42
Retardation of 35 fathom maximum after air maximum, days	—	47	51	165	—
Days of mass-cooling per 100 of heating ...	125	115	100	99	130

The lower part of Table II. gives the mean monthly temperature of the whole mass of water in each division, and shows how the annual range and the date of maximum and minimum are altered by depth and isolation. The mass of water in all the divisions except the Channel is colder than the surface layer during the period of heating, and warmer than it during cooling. The retardation of the maximum at a depth of 40 fathoms is shown to be the same as that for the surface in the Channel, 4 days later for the Arran Basin, and no less than 111 days later for the restricted Loch Goil. The contrast of the temperatures at great depths is also well brought out in Table IV.

TABLE IV.—COMPARISON OF TEMPERATURE AT 40 FATHOMS.

	Channel.	Arran Basin.	Loch Goil.	Loch Fyne.
Minimum, April, 1886	42·0	41·2	41·5	42·0
Heating, June, 1886	47·0	44·0	42·0	44·0
Maximum, September, 1886	54·5	47·4	44·2	45·0
Cooling, December, 1886	48 6	47·6	47·6	45·0

The general result of the investigation is that in such a system of tidal waters as the Clyde Sea Area the natural divisions, when classified according to the order of restricted range and retarded phase of seasonal temperature and of lowered mean temperature, are found in the order of their accessibility to tidal water, this accessibility being conditioned both by depth and configuration, as well as by actual proximity to the sea. This demonstrates the supreme importance of configuration in dominating the seasonal changes of water-temperature.

I have only here attempted to summarize the main results of the investigation, and must refer to the original memoir for all particulars as to methods and details.

The observations allowed the following, amongst other conditions, to be established:—

1. The upper 5 fathoms of water over the whole Area had, on the average of a year, a temperature 1·8° higher than that of the air.

2. The curves of seasonal variation of temperature in water at different depths were retarded in phase and restricted in range as the depth of the water was greater, and as its degree of isolation from oceanic influence was more complete.

3. The descending seasonal curve of air-temperature always cuts the seasonal curves of water-temperature, both for the superficial 5 fathoms and for the whole mass, at their maximum.

4. The influence of wind in causing the accumulation of surface water on one shore or at one end of a fjord, and the welling up of deep water at the other, frequently produces profound redistributions of temperature in the water in a very short time.

5. When water is agitated throughout its whole mass by tidal or wind action, the seasonal changes of temperature take place simultaneously from surface to bottom throughout the whole depth.

MR. SCOTT ELLIOT'S EXPEDITION TO MOUNT RUWENZORI.

THE following communication, dated "Duwona, Toru, April 15, 1894," has been received from Mr. G. F. Scott Elliot, who left England last year to explore the Ruwenzori region.

I arrived at the foot of Ruwenzori on April 1, having left Kampala on February 20. My route has been a very roundabout one, through Budda, part of Karagwe and Ankole, and I have not travelled very hard. The time spent on the ordinary management of my caravan has been also very great, and left me very little for scientific work, and all that I can say of the country is of rather a slight and superficial nature. I hope to bring back a rough map of the entire route, which, roughly speaking, borders the Victoria Nyanza as far as Kitangule, from which place I followed the Kagera to very near the point crossed by Stanley; from this spot (Kitaboka) I went almost in a straight line across Ankole (touching Stanley's route in two or three places) to Kiarutanga (see Lugard's map), thence to a ferry (Chanungera to Kuliafiri's), which lies a little south of Bukarungu, and so got to the foot of Ruwenzori. The only unknown parts of this route, so far as I know, are the course of the Kagera and some portions of Ankole. The former river is a deep, rapid current full of hippopotami, and varying from 80 to 130 yards in width. The current is at Kitangule some 2½ miles per hour, but higher up at Kitoboko it is much more rapid, probably 4 miles per hour. It has a very winding course as far as Butunguru, but after this point becomes much more direct. This point (Butunguru) marks the termination of an enormous alluvial plain, which is obviously the ancient level of the Victoria Nyanza, and after it one enters the mountains of Karagwe, which are continuous with the Ruampala range, and with one break extend almost to the shores of the Albert Edward. The plain above alluded to consists at Kitangule of some 30 to 35 feet of apparently very rich alluvial soil; it appears to slope gradually to the Victoria, and ends in a succession of heavy forests or swamps which are under water in the wet season, until finally the open water is reached. I think with irrigation this part of Buddu and Karagwe should be of inestimable value, but at present cultivation is almost confined to the various hills that rise out of it.

In Ankole the most interesting feature I found was a series of large lakes (Mbiro Nyanza), five in number, on or very near the course of the Ruizi; this river is quite different in character to the Kagera, and more like the river marshes of Buddu and Uganda. It rises amongst the hills at Katara (see Stanley's map), forms the Wamaganga swamp mentioned by Stanley, and then passes through a plain some 8 to 15 miles broad (the break alluded to above), flows close to the lakes Mbiro Nyanza, and, after passing through Kaki, enters the Victoria Nyanza between the Narudugavu and the Kagera. It does not join the Kagera, as shown on most maps. These details are, however, scarcely intelligible or interesting without a map, which I hope to produce in time.

As far as I can understand the geology of the country, both Uganda Buddu and a large part of Toru have been originally a granite plateau some 4300 feet high. This plateau even forms a border 8 to 10 miles wide round the Albert Edward Nyanza, which I passed after leaving the Ankole hills. The most curious feature it presents is the manner in which it is cut up by swamp rivers into an interminable series of hills, which render travelling almost intolerable. On this granite is a series of schists folded over and over and changing in character, which extend with interruptions to the base of Ruwenzori. These schists begin at Butunguru, and I have traced the same rocks right across Ankole to Burimba, where one descends to the granite. I have never found them at a dip of less then 80°, and their strike is some 20° to 30° east of north. They probably contain valuable minerals, but I do not care to risk an opinion on them now. It is extremely difficult to get good specimens, and one can only carry a few in this country, but the few I have should, I think, show their character.

The numerous valleys in these Ankole and Karagwe mountains are of a most curious character. They are deep, well-like trenches (perhaps 1500 feet deep on an average), and form a most intricate meshwork. A large number of villages are scattered on the hillsides, but more often at the bottom of these valleys; but the country as a whole suffers from the lack of water. The hills are covered with short grass, and should, I think, prove good grazing-ground for sheep and cattle.

Even constant travelling has not affected the health of the sheep and the unfortunate cow which have come with me, and this is a fair test of the pasture. There has been, however, such constant raiding that the country is almost destitute of cattle. The degrees of ferocity in the peoples are very curious. The Waganda come first, and have stolen from Unyoro, Koki, and Ankole. Ankole has stolen and is stealing from Mpororo, and is stronger than the unfortunate Koki, and so on. As to the people themselves, I found the Wa-Karagwe very friendly, but extremely poor, and in great awe of Europeans. I could distinguish no marked difference between them and the Wa-Ankole, except in character. The latter, though I travelled under the protection of their king Antari, killed one of my men, and it was easy to see that without protection I should have had to fight almost daily. This unfortunate man exemplifies one of the exasperating features of the Swahili porter. He had one hand, and wandered out by himself to find pembe to drink without gun or spear, and never returned; it was a country he knew to be unsafe, and where no one has anything but a goatskin hung on the shoulder, so that his clothes were of great value. It is almost impossible to make the Swahili, though he is anything but brave, understand ordinary prudence, and they will not obey one's orders on their own behalf.

The greatest want of all these countries is a ready and cheap means of communication with the coast. My reason for the roundabout route followed was to see whether the Kagera was a navigable river, but so far as I can see it is not of great promise in this respect. As far as Butunguru, it is a deep, broad stream, without rocks or rapids, and lighters could be brought to this point by steamer easily enough, the only difficulty being the rapidity of the current, numerous bends, and the extraordinary number of hippopotami. Of these latter I have seen eight or ten together frequently, and one finds them every mile or so along its course. Above this point there are rocks and a current so strong as to make navigation very difficult. The valley of the Kagera, however, would make an almost perfect railway track, so far as I have seen, and along the Mavona valley, which joins it, a track could probably be made with great ease into the heart of Ankole, and probably up to the Ruizi valley or plain. Ox-waggons seem to be the only substitute for a railway line, for which no revenue could be had in Ankole for many years. On the other hand, from the Albert Edward a railway line or even a cart track into Ankole could not be made from the north end of the Albert Edward without ruinous expense, and I fail to see how either could be made to Uganda, on account of the large number of tributaries both of the Mpango river and the Katonga.

As far as the plants are concerned, I find the same species of a very weedy character extending from Kavirondo to at least 5000 feet on Ruwenzori, and the majority extend from the coast. This does not apply, however, to the forests (of which I found none in Karagwe or Ankole) or the hills above 5000 feet. Since arriving here I have had constant attacks of fever, and been able to do nothing; but in a very short time I hope to get a camp established at a good height. Unfortunately, there is no European official here, and political affairs are not as they should be; Kabbarega's army also passed over this side of Ruwenzori and devoured most of the food; locusts have eaten a large portion of the remainder; lions and leopards have taken to eating men in the absence of sheep, and have already severely wounded two of my men, and things generally are anything but satisfactory. There is a good deal of game on the side of Ruwenzori about Fort Edward. On one day I saw nine elephants, and two days afterwards twenty-five! None took the least notice of the caravan, though we passed within 500 yards of some of them.

THE SUGAR-LOAF MOUNTAIN, MOZAMBIQUE.

By WILLIAM A. CHURCHILL, H.B.M. Consul at Mozambique.

The following account of a visit to the Sugar-Loaf Mountain, Mozambique, by Mr. William Churchill, H.B.M. Consul at Mozambique, has been forwarded to the Society by the Right Hon. the Earl of Kimberley:—

I have the honour to write to your lordship an account of a walk I took in the Makua country as far as Sugar-Loaf Mountain, which is within my district and in the vicinity of Mozambique. My reason for reporting on such a trivial matter is because for some years past no resident of Mozambique has visited Sugar-Loaf Mountain, although it is visible from Mozambique in clear weather; indeed, it forms a conspicuous landmark, which is of use to vessels navigating near this coast. The principal objection found by explorers is the existence of hostile natives, called Namaralo, who have gained the reputation of being brave robbers. This tribe has given the Portuguese no end of trouble. They periodically raid and loot such places as Mpapa and Msiriri (Portuguese, Mosuril), the chief market gardens that supply Mozambique with fresh provisions. The sufferers of these robberies are generally Indian traders. These robbers have never been punished by the Portuguese. They have made several attempts to do so, but have always failed. Not only do the Portuguese appear to be convinced of the hostility of these natives, but the natives of Mozambique are afraid of them, and report that they are slave-raiders and traders.

Mr. Hollis, United States Consul at Mozambique, came with me on this walk. Our caravan consisted of fifteen men. Those who could shoot straight were armed, and we carried provisions to last five days. We tried the experiment of employing donkeys to carry loads, but it was unsuccessful, because we had no pack-saddles; the loads were continually falling down, and the natives were unable to secure them.

On a previous occasion a guide had taken me in a devious direction, and after nine hours' walking I found that I was not halfway to the mountain. He was afraid to tell me that he thought my equipment was insufficient to enable me to penetrate into the Namaralo country. On this occasion I took no other guide than the compass, and, crossing the Msiriri creek, followed the Portuguese road to Natuli, 5½ miles from Msiriri, where there is a Portuguese mud fort. From here we struck north-west and went through a dense forest. We stopped in the Namaralo country at four o'clock in the afternoon, after having walked since six o'clock in the morning. The natives came to our encampment immediately, and sold us provisions, and fetched water for our men. They appeared as good-natured and friendly as the natives of Mozambique. Many of the youths were armed with trade guns, while others were employed in cultivating small clearings in the forest. We observed mango and cashew trees near the villages; and plantations of manioc, millet, maize, beans, ground-nuts, and tobacco. The huts were all circular-shaped.

On the next morning at six o'clock we continued our walk, crossed the dry bed of the Muhekati stream, and arrived at the mountain at midday. The forest was so dense that we did not see the mountain from the time of our starting until we arrived at its base. The Muhekati is a stream only in the rainy season, when it empties its waters into the Msiriri creek. At present water is found in the sandy bed by digging for it.

Sugar-Loaf Mountain (Makua-Mtipa; Portuguese, Monte Pão) is distant from Mozambique 26 miles as the crow flies, but I should think that the distance travelled by us was 7 miles by sea and about 30 by land. On the following morning we explored the mountain, and found it to be composed of coarse granite in which much mica was visible. According to the aneroid, it is 1050 feet above the level of the sea. From the top of the mountain we could see Mozambique, Table Mountain

(Mesa), and a range of mountains about 40 or 50 miles away. With the exception of a few isolated hills here and there, the neighbouring land was observed to be extremely flat and covered with forest.

There were swamps at the foot of all the hills passed by us, with clumps of bamboo growing near them. The forest trees are tall and handsome, and the wood is generally hard. Some of the trunks are quite straight. The Mtili variety looks very much like the trees in the Boulevards at Paris.

We were told that big game existed, but we neither saw nor heard any; nor did we see traces of them, although we spent three nights in the forest. We saw guinea-fowl, hawks, and a variety of crow differing from that of the east coast. The mountain crow is larger than those of the coast, has a larger bill tipped with white, and, instead of having white feathers all round the neck as in the coast kind, it has them only on the back of the neck. A specimen was shot, and its skin preserved. The guinea-fowls were of the blue crested variety, and were difficult to shoot on account of the thick, long grass in which they were hidden.

The first orchid I have seen here was found on a tree at a height of about thirty feet from the foot of the tree. We saw plenty of orchella weed on the mountain, as well as two varieties of plants seen in no other part of this country. Specimens were secured and taken to Mozambique.

We returned at half-past seven on the morning of the fourth day, and arrived at our starting-point at Msiriri at five o'clock in the afternoon of the same day. Our fresh-water supply having given out, we found it necessary to accelerate our pace.

Near Sugar-loaf Mountain we passed by a village and saw a Portuguese flag flying over the principal house. The flag had been given to the natives at the end of June last, on the occasion of the signing of a treaty of friendship between the Portuguese and one of the chiefs of the Namaralo tribe, who only recently looted the trading village of Mpapa.

The Namaralo are divided into two parts. Those under the old chief Mkuto-mno, or, as the Portuguese call him, Matula-muno; and those under the young chief Mkubwe-mno. The old man is inclined for peace, and is the one who has made a treaty with the Portuguese. The other evidently wishes to take his fling first. We passed through the country of both chiefs without the slightest opposition or difficulty, nor were presents demanded or given for our right of way. So there appears nothing terrible about a journey through the country of this tribe.

We frequently met small gangs of armed men carrying ground-nuts and other produce to the coast for barter. Ground-nuts are the principal articles of export. The district of Mozambique comprised between those of Cabo Delgado and Angoche produces about three thousand tons of ground-nuts for export annually, and I believe the share of the Namaralo tribe is about two hundred and fifty tons. I do not think it can be more, as the population cannot be large. While on the top of Sugar-Loaf

Mountain we noticed very little smoke which would indicate the villages, and we only saw four villages on our way. We were told that the fighting men numbered three hundred thousand, but I do not believe the whole population can exceed two or three thousand, and the armed men four or five hundred.

I believe that accounts about the Namaralo are much exaggerated. They certainly live by robbery as well as industry, as many less barbarous people continue to do. I also believe that trading centres can without much difficulty be protected from them. At present the principal trading centres are unprotected, and the forts protect no traders.

GEOGRAPHY AT THE BRITISH ASSOCIATION, OXFORD, 1894.

The British Association met at Oxford from August 8 to 15. The following were the office-bearers of Section E (Geography):—

President.—Captain W. J. L. Wharton, R.N., F.R.S. *Vice-Presidents.*—Prof. Guido Cora; J. Scott Keltie; H. J. Mackinder, M.A.; the Hon. George Brodrick, Warden of Merton College; Admiral Sir Erasmus Ommanney, C.B., F.R.S.; E. G. Ravenstein; Henry Seebohm, F.L.S., F.Z.S; Lieut.-General R. Strachey, R.E., C.S.I., F.R.S. *Secretaries.*—J. Coles, F.R.A.S.; W. Scott Dalgleish, LL.D.; H. N. Dickson, F.R.S.E.; Hugh Robert Mill, D.SC., F.R.S.E. (*Recorder*). *Committee.*—Col. Godwin-Austen, F.R.S.; J. Theodore Bent; W. T. Blanford, LL.D., F.R.S.; John Bolton; G. G. Chisholm; A. W. Clayden, M.A.; H. T. Crook; B. V. Darbishire, M.A.; Major Leonard Darwin, M.P.; H. O. Forbes, LL.D.; Rev. H. B. George; J. W. Gregory, D.SC.; Professor A. C. Haddon; Rev. J. F. Heyes; H. G. Hogarth, M.A.; Sir H. Howorth, M.P., F.R.S.; John Murray, LL.D.; H. Yule Oldham, M.A.; Commander Dubois Phillips, R.N.; Sir Lambert Playfair, K.C.M.G.; Sir Rawson W. Rawson, K.C.M.G., C.B.; Howard Saunders, F.Z.S.; Trelawney Saunders; Professor H. G. Seeley, F.R.S.; G. E. T. Smithson; Eli Sowerbutts; Canon H. B. Tristram, F.R.S.; Professor Arminius Vambéry.

At a meeting where nearly every Section had matters of special interest brought before it, Section E was well to the front, and the interest and popularity of the proceedings were sustained throughout. The meetings were held in the large North Writing School of the new examination buildings, which was almost always well filled by an audience above the average of former years. It is somewhat difficult to select any special features of the proceedings for notice, the record being chiefly one of solid hard work in many departments of geography; but a gratifying recognition of the immense range of geographical work was afforded by Dr. John Murray's paper on the "Geographical and Bathymetrical Distribution of Marine Organisms," which was listened to by a strong contingent of zoologists, who joined in the subsequent discussion. We may again remark on a great increase in the number of lantern slides exhibited, as showing the almost unlimited applications of photography to the purposes of geographical research. Several papers were by this means made intelligible to a large audience, which without their aid would have appealed only to a few specialists.

Captain Wharton's presidential address on Thursday has already been published in the *Journal*, and as most of the papers will appear either in full or in abstract, the present article will be restricted mainly to a general review of the proceedings. After a cordial vote of thanks had been accorded to Captain Wharton, Colonel H. W. Feilden read a paper on "Current Polar Exploration." Mr. D. G. Hogarth then gave an account of his researches in Asia Minor, and was followed by Dr. A. Markoff on Russian Armenia. The work of the day concluded with Mr. Cozens-Hardy's paper, "Montenegro and Albania."

Friday forenoon was chiefly occupied with papers on physical geography. Dr. H. R. Mill summarized the results of his survey of the English lakes, and, on behalf of M. A. Delebecque, described the similar work of that investigator on the lakes of France. Mr. H. N. Dickson followed with a paper on the "Seasonal Movements of the Water in the North Sea and North Atlantic." Mr. John Thomson then submitted a paper on Geographical Photography, in which he dealt with the difficulties experienced by travellers, especially in tropical countries, in the use of photography as an aid to exploration. Practical hints were given for preserving plates and negatives, and for correcting errors in exposure and development, good and bad examples being exhibited in the lantern.

In the afternoon, Mr. H. Yule Oldham read an extremely suggestive paper on "A New Light on the Discovery of America." Mr. Yule Oldham's conclusion that there is satisfactory evidence of South America having been discovered in the year of the birth of Columbus, was somewhat severely criticized in the discussion which followed; but it was agreed that his methods were worthy of extended application. Mr. O. H. Howarth read a paper on "Explorations in the Sierra Madre of Mexico," in which he discussed the physical features common to the whole western range of North America, from Oregon to Guatemala, and compared them with those of the Atlas and Caucasus ranges. The variations of climate in the Sierra Madre, and their effect upon mountain-dwellers, including certain of the isolated Indian tribes and the cave-dwellers of Sonora and Chihuahua, were described and illustrated; and much new light was thrown on the physical geography, geology, and ethnology of these little-known regions.

On Monday morning the meeting opened with a paper by Miss Frances Baildon, describing a visit to British New Guinea. The author and her brother visited Port Moresby in August 1891, and, after a short stay, proceeded westward along the coast for 150 miles to Motumotu, whence a canoe-voyage was undertaken to the inland village of Moviavi. Mr. E. G. Ravenstein read a very important paper on the "Climatology of Tropical Africa," forming the report of the Committee on that subject. Mr. H. Weld Blundell described a visit to Siwa and other places in the Libyan desert; and Colonel Godwin-Austen gave some hitherto unpublished material collected during the journey of the last mission to the court of the Dhurm and Del Raja, under the late Sir Ashley Eden, in 1864, concerning Bhutan and the Eastern Himalaya. A paper by Mr. G. G. Chisholm, on the "Orthography of Geographical Names," was followed by a discussion which occupied the remainder of the afternoon.

On Tuesday morning a paper by Mr. J. Y. Buchanan, on "Researches by the Prince of Monaco in the North Atlantic and in the Mediterranean during the Summer of 1894," was read by Dr. Mill. The recent work of the yacht *Princess Alice* shows that, for a considerable distance to the east of Gibraltar and Ceuta, the surface-water is mainly derived from the Atlantic. The normal temperatures observed varied from 15° C. to 17·4° C., but under the influence of hot winds readings as high as 29° C. were obtained. An improved form of dredge, devised by the Prince of Monaco for use in deep water, has afforded some new information with regard to the fauna of a very striking character. Dr. Mill next read the report of the Committee on Antarctic Exploration, which has had few opportunities of work during the past year, owing to the small development of fishing enterprise in those regions. It was agreed to bring the claims of Antarctic research prominently before the Council of the Association, with the view of urging that a memorial be presented to Government, representing the great scientific results to be expected from a properly equipped Antarctic expedition. Mr. Keltie communicated a paper by Mr. A. Montefiore, on the outfit and equipment of the Jackson-Harmsworth expedition. Dr. Murray discoursed on the distribution of marine organisms, first giving a luminous exposition of our present knowledge of the facts, and then attempting to account for the separate polar belts of identical fauna in the northern and southern hemispheres by the supposition that at one time the entire globe enjoyed a uniform climate, the sun being then possibly as large as the orbit of Venus. The distribution of animal life would under such circumstances also be uniform, and inequalities would arise with inequalities of climate due to the shrinkage of the sun, and consequent curtailment of the area exposed to its vertical rays. After the discussion on Dr. Murray's paper the Section adjourned, and in the afternoon Mr. Bent gave an account of his journeys in the Hadramut, his paper constituting the report of the Committee on the exploration of that district. Mr. Somers Clarke presented a paper on the geography of Lower Nubia, which dealt chiefly with the country which would be flooded by the proposed Nile reservoir. He pointed out that the projected reservoir nearly coincides with the Wadi Kenus, the abode of the Beni Kensi tribe, and that if the scheme is carried out in its present form, 10,000 acres of cultivable land will be submerged. In view of the contemplated destruction of many unique antiquities, as well as of the home of an extremely interesting people, Mr. Clarke urged the need of an exhaustive scientific survey of the district. Professor Norman Lockyer and Mr. F. C. Penrose, who took part in the discussion which followed, supported Mr. Clarke's proposal.

The work of the section concluded with some illustrations by Mr. B. V. Darbishire, of a new method of representing the vertical relief of the British Isles. The usual votes of thanks were then awarded to the Local Committee, and to the President, Vice-Presidents, and Secretaries of the Section.

Mr. W. H. White was unable to deliver his lecture on Friday evening, and his place was taken by Dr. J. W. Gregory, who discoursed to a large audience in the Sheldonian Theatre on "Experiences and Prospects of African Exploration." It is seldom that a geographer is selected to deliver one of the evening lectures, and the success achieved by Dr. Gregory is therefore all the more gratifying.

THE MONTHLY RECORD.

EUROPE.

Population at Different Elevations.—The distribution of population in regions having different elevations continues to receive increased attention amongst continental geographers. Signor Marinelli Olinto contributes to the *Rivista, Geografica Italiana* an interesting discussion of the population statistics of Sicily. The data are obtained from the *Annuario statistico italiano* for 1889–90, in which the results of the census of 1881 are arranged according to zones of elevation above sea-level. Dividing the island into three slopes, the Mediterranean, the Tyrrhenian, and the Ionian, the author made careful planimetric measurements of the contour lines from Fritzsche's recent map, and from the areas obtained computed the mean density of population. The results are as follows:—

Height (metres).	Inhabitants per square kilometre.			
	Mediterranean.	Ionian.	Tyrrhenian.	Sicily.
0–50	74·3	340·5	1003·0	353·2
50–100	51·3	99·0	160·6	93·4
100–200	72·9	130·8	97·9	92·3
200–300	38·4	64·1	78·6	55·1
300–400	69·5	53·5	112·8	74·5
400–500	137·4	41·0	114·2	108·5
500–600	159·8	150·7	120·8	146·5
600–700	202·8	146·0	76·4	147·6
700–800	90·2	137·1	94·0	106·2
800–900	32·6	83·6	29·6	46·1
900–1000	156·1	12·0	96·4	74·9
Above 1000	122·8	34·5	32·6	43·7
Total ...	92·2	112·6	148·7	113·4

Further, the following table is obtained by graphic methods:—

Slope.	Average height at which the population is found.	Mean height of the land.	Ratio.
	Metres.	Metres.	
Mediterranean	439	372	1·18
Ionian	283	522	0·54
Tyrrhenian	250	478	0·54
Sicily	339	441	0·77

The numbers are certainly extremely irregular, but, assuming that on the whole the density of population is normally greatest near sea-level, they confirm the view, expressed by Réclus and others, that a liability to invasion tends to drive the centres of population towards more elevated regions away from the coast. The peculiarity, so strongly marked on the Mediterranean slope, will probably disappear in more peaceful times and under more settled government. Dr. Karl Grissinger contributes to the *Mitteilungen der k. k. Geographischen Gesellschaft* an elaborate statistical paper on the distribution of centres of population in Austria-Hungary. Centres of more than 2000 inhabitants are discussed in detail, and subsidiary tables are given relating to centres exceeding 5000, 10,000, 20,000, 50,000, and 100,000. The area is divided into five approximately equal districts, each of which is treated separately, and in individual cases the results are of undoubted interest. While the number of centres of population occurring within a certain area seems to follow the density of population pretty closely, it does not appear that arrangement according to elevation affords much help in discussing the complex causes which determine their distribution.

The Bathymetrical Survey of the French Lakes.—We have received the 'Atlas des Lacs Français,' recently published by the Ministère des Travaux Publics, which contains ten plates of maps of the French lakes, with contour-lines at intervals of 5 or 10 metres, based on the elaborate soundings of M. A. Delebecque. M. Delebecque communicated a paper to Section E of the British Association, describing the methods he has employed, and a set of his maps was exhibited. In the earlier parts of the work the sounding-apparatus of the Swiss Bureau Topographique was used, but this was subsequently replaced by a Belloc machine, and ultimately by one of M. Delebecque's own invention. In every case the measurements depended on the number of revolutions made by a graduated drum, on which the steel sounding-wire was wound, and M. Delebecque's instrument had a great merit in respect that its total weight amounted to only 9 lbs. The position of each sounding was determined either from angular measurements of the graduated mast of the boat taken from the shore, or by sextant bearings taken from the boat. It would accordingly appear that the maps are founded on measurements of great accuracy. They include the following lakes: Lake of Geneva (the Swiss part sounded by M. Hörnlimann, of the Bureau Topographique Féderal), scale $\frac{1}{30000}$; Lake of Bourget, scale $\frac{1}{20000}$; Lake of Annecy, scale $\frac{1}{20000}$; Lake of Aiguebelette (Savoy), scale $\frac{1}{10000}$; Lake of Paladru (Isère), scale $\frac{1}{10000}$; Lakes of Brenets, St. Point, Romoray, and Malpas (Doubs), scale $\frac{1}{10000}$; Lakes of Nantua, Sylans, and Senin (Ain), scale $\frac{1}{10000}$; Lakes of Chalain, Dessus, Dessous, Marlay, La Motte, Grand Maclu, and Petit Maclu (Jura), scale $\frac{1}{10000}$; Lakes of Saffray and Petit Chat (Isère), La Girotte (Savoy), Issarlés (Ardèche), Bouchet (Haute Loire), Pavin, Chauvet, Godivelle, and Tazanet (Prey-de-Dôme), all scale $\frac{1}{10000}$. This long list represents only a part of M. Delebecque's work, as a large number of other lakes have been roughly sounded, and many observations of temperature and chemical composition have been made. The atlas is to be completed by maps of several lakes in the Jura and in the Pyrenees, and will then only form part of a comprehensive memoir on the limnology of France.

ASIA.

Colonel Holdich on the Route of Alexander the Great.—Colonel Holdich's lecture at the United Service Institution at Simla on Alexander's retreat from India is an important contribution to an old subject, because of the author's personal acquaintance with the region under discussion, an advantage that many geographers have lacked. Potala, the point of departure, Colonel Holdich is inclined to place about 30 miles south-east of Hyderabad (General Cunningham's suggestion) and 60 miles east-north-east of Thata. Into Makran Alexander marched by the old mediæval route which connected it with Sind in the days of Arab ascendancy, a route that has been used as a highway into India for nearly eight centuries. After defeating the Oritæ near Luo Bela, Colonel Holdich considers that Alexander must have followed the valley of the Phur to the coast, and pushed on along the track of the modern telegraph line till he reached the neighbourhood of the Hingol river, where he made a considerable halt to collect food and supplies for his fleet. Here comes one of the more important of Colonel Holdich's identifications. Alexander's way to the west was then blocked by the Malan range, and there appears to be but one possible route that he could have selected. He must have ascended the Hingol till he could turn the Malan by the first available pass westward. Nothing has altered since his days, and the point where he left the Hingol seems to be fixed by the mention of the Parikanoi, which Colonel Holdich identifies with the bed of the stream called Parkan, skirting the north of the Taloi range, and leading westwards from the Hingol. The Sagittæ and Sacæ, two other peoples mentioned in history as tribes with whom he had to contend, seem to be found in the Sajidi, a tribe of Jalawan Brahins, of which the chief family is called Sakæ, and who occupy territory a little north of Parkan. At the time of the year that he was pushing his way along the Taloi hills, which rose 2000 feet above him on his left, there could not have been a drop of water to be had, and this fully accounts for the miseries that were crowded into this part of the march (about 200 miles) between Hingol and the coast. The point where the latter was struck was probably Pasni. Thence, as Arnan tells us, he marched for seven days along the coast till he reached the well-known highway to Carmania. Colonel Holdich points out that Arnan was probably right in declaring that it was Alexander's obstinate determination to do that which proved so fatal to Semiramis and Cyrus that led him to select the worst possible route through Makran, because the high-road was known even before his time. Some centuries later we find Makran "a country of great and flourishing cities, of high-roads connecting them with well-known and well-marked stages, armies passing and repassing, and a trade which represented to those that held it the dominant commercial power of the world. The history of Makran is the history of India from time immemorial. Not all the passes of all the frontiers of India put together have seen such traffic into the broad plains of Hindustan as for certainly three and possibly for eight centuries passed through the gateways of Makran. As one by one we can now lay our finger on the site of those historic cities, we can only be astonished that for four centuries more Makran has remained a blank on the map of the world."

The Ruins of Old Merv.—The ruins of the ancient towns of Merv have been carefully examined by Professor Skaukowskig, of St. Petersburg, from whose description (in Russian) a short account has been given by L. Cohn in *Pet. Mitt.*, 1894, No. 3. They occur near the Bairam Ali station, on the Transcaspian railway, about 16½ miles from the present town of Merv, and represent three distinct former towns of different epochs, following in succession from north-east to south-west. Each was in the form of a fortress, surrounded by high walls, which are still to be distinguished. The oldest, "Gyaur-kala," was the Merv of the Sassanids and Arabs. In this, as in the other two, are the remains of a citadel. The only space within the walls is filled with mounds covered with broken tiles, the remains of former houses. The second fortress (Sultan-Kala) is that of the Persian Seljuks, whose capital it was. In the centre is the mausoleum of the most popular of these, Sultan Sandschara, showing traces of elegant architecture and rich ornamentation. Some of the fragments of tiles among the ruins have a blue glaze. A semicircular wall joins the northern and southern walls of Sultan-Kala, enclosing a space known as "Tskender-Kala." This is popularly attributed to Alexander the Great, but so far no proof exists that it has a different origin to Sultan Kala. The third fortress, "Bairam-ali-Khan-Kala," was destroyed little more than a hundred years ago by Murad-Bi of Bokhara, who removed many of the inhabitants by force. The walls and buildings, which include the palace, mosque, baths, an aqueduct, etc., are naturally in better preservation than in the older towns. Outside the walls for some miles there are ruins of houses built of clay or unburnt brick, mostly with courtyards surrounded by walls, traces of vineyards and mulberry groves still remaining in places. An attempt to learn more of the history of Merv from the descendants of its old inhabitants in Samarkand and Bokhara proved fruitless.

Samarkand.—The 'Almanack of the Samark and Province for the year 1894, published by the Statistical Committee, edited by M. Virsky' (Samarkand, 1894), contains, besides the usual lists of all functionaries, a valuable paper by the editor on the culture of the cotton-tree; an elaborate paper on the town of Samarkand and its district; and a variety of smaller papers on the trade of Bokhara, the changing value of its money, on the progress made in Samarkand during the last twenty-five years, and two medical papers, on the local medicine and witchcraft in use among the Sart women, and on the parasitical disease of the "rishta" (*Filaria medinensis*). No general census of the population has yet been made; it is simply calculated at so many persons in each *kibitka* of the nomads (five), and is estimated at 735,000 natives and 15,000 Russians. Of Russian settlers there are only five villages, all in the district of Khojent. The total crops in the province amounted to 8,640,000 quarters of cereals in 1892, as against 6,102,000 quarters in 1891. About 135 acres are under vineyards, and nearly 1,250,000 cwt. of grapes had been obtained, of which only one-tenth is used for wine. The culture of the cotton-tree makes rapid progress, the total crop of raw cotton being 516,800 cwt., of which 184,000 cwt., valued at 1,761,350 roubles (£176,135), of refined cotton were obtained for export to Russia. Mining has been on the decline. The petty trades of the population are valued at above 3,000,000 roubles. The province has 1932 Musulman schools, but only eleven Russian schools, or for Russians and natives; 18,670 boys and girls received education in these schools.

Changes at Aden.—In his paper on "Aden Harbour," published in the last volume of the 'Minutes of Proceedings of the Institution of Civil Engineers,' Mr. W. S. Child refers to certain changes in the topographical features of the district which, in his opinion, have taken place within historic time. The Wadi Alkabir, the only river flowing into the harbour, has from time to time changed its course, and formerly had, in all probability, two or more different outlets at once. The author has traced two of these former courses, which are marked by numerous deposits of rounded pebbles. The one to the east of the existing river has evidently been the cause of the silting up of an aqueduct, constructed for supplying Aden with water. The peninsula of Aden, and the rocky promontory on the western side of the harbour, were doubtless islands at no remote period. Important changes in the coast-line have taken place on the west coast of Arabia. The deserted village of Muza, now 20 miles inland from Mocha, is referred to by ancient writers as one of the principal emporia of the maritime trade of Yemen. Several other places along the coast are also reported to have been formerly seaports, particularly the towns of Okchis and Zabid. The Wadi Alkabir no doubt aided greatly in connecting the rock of Aden with the sandy plain, by bringing down materials from the uplands, which were deposited in the quieter water under the lee of the main rocks and the various minor rocky islets, such as Aliyah and Jan Ali, which studded the sea in the locality.

AFRICA.

The Development of the Portuguese Possessions in South-East Africa.—After concluding the delimitation of the frontier between the South African Republic and the adjoining possessions of Portugal, the three commissioners of the latter separated at the confluence of the Pafuri with the Limpopo, reaching the coast by different routes in order to add as much as possible to the knowledge of the country south of the Sabi river. Captain de Andrade proceeded east to Mhambane, across the Ma-chengua plateau (traversed by previous travellers mainly from north to south); Captain Serrano being charged with the exploration of the Chengane, which carries the drainage of that plateau southwards to the Limpopo; while Major Xavier proceeded in a small boat down the latter river in order to study the possibilities of navigation on it. The last-named gives the result of his journey in the *Boletin* of the Lisbon Geographical Society (1894, No. 3), together with copious notes on the relations of the Portuguese government with the native tribes, and the steps necessary to bring about a more hopeful state of affairs than at present prevails. He divides the Limpopo, in its course within the Portuguese possessions, into three sections, the uppermost of which, extending over 186 miles down to the mouth of the Elephant river, cannot be navigated in the dry season, though for three or four months it can be traversed by small vessels such as ply upon the second section throughout the year, while for twenty days or more, at the highest flood, all the vessels which can cross the bar, could reach the frontier. The second section, 62 miles, extends to Mahamba, where the higher ground recedes from the banks and gives place to the thickly-peopled plain of fertile clayey soil known as Biléne, which extends to the sea. This section, together with the lower course of the Chengane, can be always navigated by stern-wheel steamers of slight draught. The third section, of 93 miles, has a minimum depth of from 3 to 8 feet according to the distance from the mouth. Of the minor streams, the Incomati, Motamba, and Inharrime are navigable in parts, and with a suitable system of cart-roads, which could be constructed at slight cost, the internal communication could be much improved in the interests of trade, without waiting for the slow and costly construction of a railway. The great desideratum in the relations with the native tribes is the display of sufficient force to uphold the Portuguese prestige as against the Vatua or Mangúni power. This race, which came from Zululand within recent years, has asserted its supremacy over the other tribes, who cannot be brought under the Portuguese influence unless the latter government is strong enough to protect them. Major Xavier urges the employment of European troops, reinforced by a native army, in order to bring Gungunyana to reason, and to allow of the occupation of suitable posts within his dominions. He does not at all favour the cession of sovereign rights to companies, holding that, with good administration by government, the populous valley of the Limpopo should yield a sufficient revenue to do away with the colonial deficit. Most of the country south of the Sabi, except the Ma-chengue plateau, is adapted for the system of colonization under which planting is directed by Europeans, natives supplying the labour. This is the only one suited both to the climate of the country, and the resources of Portugal.

Journey of Counts Hoyos and Coudenhove in Somaliland.—This journey, which lasted from November, 1893, to March, 1894, was undertaken primarily for the purpose of sport, but additions were made to our knowledge of the topography of the country traversed by the carrying out of a route survey with watch and compass. An account of the journey appears in the *Mitteilungen* of the Vienna Geographical Society (vol. xxxvii. p. 337), accompanied by a large scale map constructed by Professor Paulitschke, in which the information supplied by other travellers, especially Colonel Paget and Captain Swayne, has also been utilized. The route of the Austrian travellers followed in the main the caravan track leading from Berbera to the south-west by Hargeisa or Little Harar, and thence *viâ* Milmil to the Webi Shabeyli, which was first traversed in 1891 by Baudi and Candeo, and subsequently by other travellers, and thus their work consists rather in the filling up of topographical details than of breaking new ground. They have, in particular, thrown new light on some of the northern tributaries of the Webi Shabeyli and on the topography of the country immediately to the south of that river, inhabited by the Aulihan, some of whose settlements were visited. From Berbera the country rises rapidly to the Somali plateau, falling more gradually to the south, in which direction it is cut up by the beds of streams, some of which contain a fair amount of water in the rainy season, and find their way to the Webi Shabeyli. The latter river where crossed was about 100 paces wide, and its banks were well wooded. Numerous mountain peaks and plateau-escarpments were observed from the route, profiles of which are given on the map. The conical peak of Doje, in particular, was visible from a long distance. Antelopes of various species were met with throughout, and lions, rhinoceros, giraffes, etc., in parts. The last-named, which are growing very scarce, were unsuccessfully followed on one or two occasions. From the furthest point reached a salt-mountain was reported to the south, named Spoda-Oldar, and beyond it the river Web flowed from west to east, uniting with the Ganana to the south-east. It thus seems, as remarked by Dr. Paulitschke, that these rivers have rather an easterly or south-easterly course than the southerly one assigned to them on the map in *Petermanns Mitteilungen* (1894, plate 9).

The Waziba Tribe, Central Africa.—In the *Mitt. aus d. Deutschen Schutzgeb.* (1894, part 1), Captain Hermann gives an account of the Waziba, the tribe which inhabits the western shore of the Victoria Nyanza, south of the Kagera river, and north of the Wazinja territories. To the west their district is separated from Karagwe (which nowhere touches the lake) partly by an uninhabited strip of country, and partly by Lake Urigi. It occupies a plateau which falls steeply in various directions, and is cut in two by the Ngono tributary of the Kagera. The greater part of the surface is covered by low bush and by banana plantations, which supply the chief food of the tribe. Although very moist (rain falling almost daily throughout the year), the climate is healthy and pleasant. The tribe has long lived in isolation, and although the name, under the form Kiziwa, together with those of some of the separate districts and of their chiefs, appeared in Stanley's map of 1878, little was known of it until the founding of the German station of Bukoba by Emin Pasha, shortly after which Father Schynse also gathered some information about it. The name is applied to the tribe generally by outsiders only, being properly that of one of the five districts, under independent chiefs, into which it is divided. All of the latter, until the Germans appeared, owed allegiance to Uganda. The ruling families, with one exception, belong to the Wahuma or Watusi; but the bulk of the population, estimated by Captain Hermann at 150,000, have been settled in their present habitat from time immemorial. They are a well-developed and healthy race, tall and slim, with long narrow face, without the typical negro features. Their colour is an even "lamp-black." In speech they are very near the Wanyoro. Full details are given by Captain Hermann as to their dwellings, clothing, implements, customs, etc. The first named are of the beehive type, sometimes over 30 feet high, with a sort of covered porch before the doorway, which is the only aperture. European materials are little used as clothing, and although the caravan-track from Unyamwezi to Uganda and Unyoro leads through the country, it has been little touched by outside influences. Yet the people are intelligent and superior to other more favourably situated races. They have shown themselves well-disposed to the Germans, whose advent has done much to free them from the exactions of the Waganda.

Geology of South Algeria.—The extension of French influence into the extreme south of Algeria has given opportunities for the scientific examination of that country, of which advantage has been taken by Captain Almand, the officer commissioned to establish a fort at Hassi el Homeur, on the road from El Golea to Gurara. His attention has been directed in particular to the geology of the country, his notes on which have been communicated to the Paris Geographical Society (*vide* C. R. 1894, pp. 38, 166). His excursions to the plateau escarpment east of El Homeur, and to an isolated truncated cone, the Gara Kerbub, standing out from it, show that the limestones of the base are capped by calcareous and marly strata, of which the rocky surface of the plateau is composed. The flints and calcareous *débris* so covered the lower slopes, that it was with difficulty that the subjacent rock could be examined. Captain Almand has also carried out meteorological observations at El Homeur, and taken photographs of the surrounding country.

AMERICA.

Mr. Yule Oldham on the Early Discovery of America.—Although it cannot be said that the conclusions reached by Mr. Yule Oldham in his paper on this subject at the British Association met with general acceptance, there is no doubt that he has tapped a mine which may yield valuable results after further research, and has drawn attention to sources of information lately somewhat neglected. Mr. Yule Oldham has drawn his conclusions from an abbreviation of the map drawn by Andrea Bianco of Venice, and dated A.D. 1448. On this map are found for the first time the Portuguese discoveries near Cape Verd, which was rounded in 1445 by one of the Portuguese expeditions of Prince Henry the Navigator; and in addition to these there is drawn at the edge of the map, south-west from Cape Verd, a long stretch of coast-line labelled "Authentic Island," with a further statement that it stretches "1500 miles westward." In 'The Discoveries of the World,' published in the middle of the sixteenth century, Antonio Galvano says that in 1447 a Portuguese ship was carried by a great tempest far westwards until an island was discovered, from which gold was brought back to Portugal. Whether this amounts to actual evidence that the coast of Brazil was discovered in the year of Columbus' birth is another matter, and the meteorological and other difficulties are surely greater than Mr. Yule Oldham is inclined to suppose, but the point is of great interest.

AUSTRALASIA.

The Brandenburg Coast, New Guinea.—The separate name given to this part of the coast of German New Guinea by Dr. Otto Finsch (from whose diary a short note on it is given in *Petermanns Mitteilungen*, 1894, No. 3, with a map by P. Langhans), is justified by the fact that it is apparently the only part in which coconut palms occur in sufficient numbers to promise a paying export of *copra*. The coast forms the northern skirt of the Toricelli Range, whose highest point, the Hohenlohe-Langenburg peak, has a height of about 2950 feet. The streams which flow down from this range are not of great size. The coast as a whole is very thickly inhabited, especially where covered with coconut groves, beneath which most of the villages are concealed. The best copra district is in the neighbourhood of the Sainson Islands, which form the "Berlin Haven" discovered by Dr. Finsch. The spurs of the mountains are thickly wooded, some of the trees being of colossal size. In places, especially between the Albrecht river and the Sainson Islands, the forests skirt the shores, and, with the abundant water-power available, might repay the erection of saw-mills. On the Albrecht river and elsewhere tall casuarinas occur, which, from their resemblance to larches, give a European character to the landscape.

POLAR REGIONS.

Colonel Feilden on Current Polar Exploration.—The extraordinary fact that the fate of no less than four Arctic expeditions hung in the balance naturally caused Colonel Feilden's paper at the British Association on their comparative prospects to excite a great deal of interest. The experiences of the Wellman expedition have since become sufficiently familiar to us, and it is needless to do more than point out the remarkable manner in which Colonel Feilden's prophecies with regard to that enterprise have been fulfilled, and to express the hope that their fulfilment will add still greater weight to the words of warning he addressed to the public against encouraging even the boldest and bravest men to undertake Arctic exploration without first attaining the skill and knowledge of experience. Colonel Feilden discussed in some detail the prospects of Nansen's expedition, founding his belief in the general correctness of Nansen's views as to the Polar currents partly on the movements of the East Greenland ice, but chiefly on the drift wood stranded along the coast of Grinnell Land, north-west of Cape Union, and on the north coast of Greenland between Repulse Bay and Cape Britannia. From the observations made by himself during Sir George Nares' expedition, Colonel Feilden entertains no doubt that the vast quantities of wood have been brought from Siberia, and that at considerable speed, but the fact is by no means sufficient to ensure the success of the *Fram*, or to make her voyage anything but daring and hazardous in the extreme. We may, however, share fully in Colonel Feilden's confidence that, whatever happens to his vessel, Dr. Nansen's boldness and resource will bring his expedition safely back to civilization. With regard to the Jackson-Harmsworth expedition, Colonel Feilden thinks that the difficulties of Franz Josef Land would seem to have been rather underestimated. Although the route of Peary and Astrup is unlikely to lead to a favourable point from which to reach the Pole, the immense geographical importance of his work is undeniable. Colonel Feilden described most graphically his ascent with Sir George Nares ot Mount Julia, and the view obtained from its summit. As the altitude was not less than 2000 feet, the view Polewards was probably as extensive as was that obtained by Lockwood, which was from a point apparently near sea-level, although 39 miles further north. The unbroken ice-pack stretched to the horizon, distant at least 50 miles, in lat. 83° 35′ N., and to the eastward, distant not less than 120 miles, the northern points of Greenland about Cape Britannia were plainly seen. Colonel Feilden predicts that if Peary is successful in exploring the northern apex of Greenland, he will find the land ends somewhere between lat. 83° 35′ and 84°, and be there arrested by impassable ice. The chances of attaining the Pole with our present resources are but small at the best; probably the only hope lies in following the footsteps of Parry, near the meridian of North Spitzbergen.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Singular Bathymetric Phenomenon in the Lagoon of Venice.—Attention is called by O. Marinelli in the *Revista Geographica Italiana* (April, 1894) to a remarkable submarine trough which occurs in the Lagoon of Venice, just where the bank which separates the latter from the sea is broken by the Porto di Malamocco. While the neighbouring parts of the lagoon do not exceed 60 feet in depth, this depression, which occupies a very small area elongated in a direction parallel to the shore, reaches a depth of almost 164 feet, which is hardly equalled anywhere in the Adriatic north of a line joining the mouths of the Po with the southern points of Istria. The angle of slope of its borders is therefore exceedingly steep, amounting to about 45° on the eastern side. Other depressions occur in analogous positions in relation to the openings of the lagoon, but their depths are not to be compared with that of the first mentioned. The origin and persistence of this trough are alike difficult to explain. It can hardly be due solely to the action of currents, although these would be most active in the vicinity of channels leading to the sea. Nor is the explanation devoid of difficulties which would consider it a former sub-aerial hollow since submerged, and in any case the reason for its not having been filled by alluvial matter is obscure. In an editorial note, Dr. Pasanisi calls attention to other "submarine valleys," as they may well be called, some of which have been thought to be due to tectonic forces.

Recent Studies in Orography.—Two studies in the physical geography of mountain ranges, in its relation to the forces which have called them into existence, have lately appeared, one by M. E. Haug, dealing with the Alps, in the *Annales de Géographie* (1894, p. 150), the other on the Pyrenees, by MM. Schrader and de Margerie, as a reprint from the *Annuaire* of the French Alpine Club for 1892. In the light of the latest investigations into the morphology of various parts of the Alps, M. Haug endeavours to divide the whole range into natural regions, possessing a geographical unity, though based to a large extent on geological structure, and the process of folding which originated the range. The task is no easy one, owing to the difficulty of always satisfying the two requirements at once. Attempts to define the limits of locally recognized groups by the crests of ridges, or even by the courses of streams, have led to arbitrary subdivision. The basis of M. Haug's method is the occurrence of the various formations represented in longitudinal zones, the bounding lines between which are often clearly marked geographically by important longitudinal valleys, as (in part) those of the Isère, Upper Rhone, and Inn. The subdivision of these zones into geographical units is naturally more or less arbitrary. In the eastern Alps the arrangement is very simple, a central zone of crystalline schists being flanked north and south by calcareous ranges, with rocks of other character still further outwards, forming a continuous zone, however, only in the north. In the west the structure is much more complicated, and the writer here enters into a more minute examination of it. In the establishment of natural zones he to some extent follows M. Lory, one of the chief authorities on this part of the Alps, though differing from him in certain details. Besides the French sub-Alpine chains, M. Haug defines five zones, basing the division rather on the nature and direction of the folds than on the particular rocks at present on the surface, the same traces of ancient dislocations being seen in the central crystalline *massifs* as in the sedimentary deposits which separate them, and which must have formerly covered them also. Thus the *massif* of Mont Blanc is considered by him to belong to the zone of calcareous ridges which stretch from Martigny to the Rhine, past the Lakes of Thun, Brienz, and Lucerne. Crystalline schists form a distinct zone (that of Monte Rosa) in the western as in the eastern Alps. The northern calcareous ranges are here included in three separate zones, while those to the south are entirely wanting. Of the zones established in the eastern Alps, only the most northern has any direct continuation in the west, all the others bending to the south-west between the Adige and Upper Rhine. In the region of the latter is a group of central *massifs*, which occupy a peculiar position from the north to south direction of their axes. It is here, therefore, that the scientific division of the range into an eastern and western half must be made, the last-named group being not of sufficient importance to form a subdivision of the first rank. The natural regions thus constituted, which are shown on a map accompanying the paper, do not coincide with those recognized by the popular nomenclature, the western part of the Bernese Alps, *e.g.* (west of Louéche), falling into a different zone from the rest of the group, and similarly in the case of others. The paper on the form and relief of the Pyrenees is accompanied by an excellent map, with contours 500 metres apart. The point which this brings out most clearly is the preponderance of the band, between 500 and 1000 metres (1640 and 3280 feet), consisting of tertiary strata, forming a sort of platform from which the central range rises. This feature, which belongs to the primeval structure of the range, is now most marked on the Spanish side, the tertiary strata having been largely removed by denudation towards France. On the former side it is bounded externally by a series of anticlinal ranges parallel to those in the central region. The different separate ranges of the latter (the Pyrenees proper) are disposed at various angles with the general direction of the chain (which is the resultant of the individual forces which have given rise to it), and the line of highest summits constantly diverges from that of the water parting. The salient feature in this seeming confusion is the predominance of folds with a direction E. 30° S., bending round towards the east-north-east. With regard to the features impressed by the action of running water, a great contrast exists between the two slopes. Towards France, where denudation has been more active, and especially at the Atlantic end, where the rainfall is greatest, transverse valleys are the rule, while to the south most of the rivers in part follow the direction of longitudinal folds, the valleys in some cases retaining the original form of the latter. Both the superficies and mass of the range have been greatly underestimated, through ignorance of the preponderating importance of the Spanish slope. The authors' calculations give 1195 metres (3920 feet) as the mean height. The portions below 1000 metres (3280 feet) form over three-fourths of the total mass, the highest summits contributing a comparatively insignificant amount.

Botanical Geography: Lectures in Paris.—The old Sorbonne at Paris is being rapidly transformed into a magnificent mass of buildings, wherein the various departments have ample accommodation and adequate appliances for carrying on research and teaching of the highest excellence. The Geographical department was ready some time ago, and at the beginning of last winter the new botanical laboratories and lecture-rooms were opened. Professor Bonnier inaugurated the session by a course of lectures on Botanical Geography, a subject never before treated at the Sorbonne. Professor Bonnier has done much to further an experimental study of many of the problems of geographical botany, especially in showing the influence of change of climate on plants. Too many botanists, when discussing geographical botany, content themselves with giving the limits of the distribution of species, and a description of the plants in the different natural regions. Professor Bonnier, in his opening lecture, published in the *Annales de Géographie* for April, 1894, sketches his own more thorough methods. The nature of the plant, and the conditions under which it lives best, have much to do with its distribution. One plant flourishes in sandy soil and does not grow well in a limestone region; another appears in the salt lands near the sea, but does not prosper in the fresh clays of the interior. Climate is even more important than soil in determining distribution, and the leading factor in climate is temperature. There is a gradual transition from the olive groves of the Mediterranean to the mosses and lichens near he snow-line of the Alps or of Arctic lands. Secondary climate differences prevent the two series being exactly comparable: the moisture north receives more sunlight during summer than the very dry mountain-tops. The Alpine plant is very often a dwarfed variety of that of the plain, with reduced but thick leaves of intenser green, and flowers of stronger colour than its lowland relative, which it comes to resemble when transplanted to the plain. The ancestry of each plant and its habitat must be known before the distribution of the present species can be understood, and this study of vegetable palæontology leads up to the many intricate problems of the relation between present and past conditions of our globe. It is rarely possible to study the actual growth of a flora from the beginning, but the Krakatoa eruption left an island rising to about 2500 feet without vegetation. Soon the pumice was covered with fresh-water algæ, which, mixed with the *débris*, formed a soil where, three years after the eruption, Treub found ferns everywhere, but only a few flowering plants along the shore. The further study of the colonization of this virgin soil by plants promises results of much interest.

The Cruise of the "Princess Alice" in 1894.—To the Oxford meeting of the British Association, Mr. J. Y. Buchanan sent a paper on the cruise of the Prince of Monaco's yacht during the past summer. The programme with which the yacht started to work in the deep water between Gibraltar and the Azores had to be abandoned. Mr. Buchanan joined the yacht at Gibraltar on June 26. Observations were made in the narrowest part of the strait at distances of a mile apart from Ceuta to Gibraltar. The density of the samples showed that the water came mainly from the Atlantic. The superficial extent of the Atlantic water rapidly increases in going east, but the depth diminishes. When anchored off Tangier a typical example of the föhn wind was experienced, the average temperature of the air being 20° to 22° C., with puffs of 28° or 29°. Leaving Tangier on July 5, the yacht pursued a south-westerly course, sounding and dredging in depths of from 1500 to 4000 metres. Many interesting results were obtained, but unfortunately with the loss of much material. The Prince of Monaco has introduced improvements in apparatus, including a fine cord or cable of three strands, each of three fine galvanized steel wires, as a sounding-line. It is only 2·3 milimetres in diameter, with a breaking strain of 250 kilogrammes. This steel cord is much easier and safer to use than a single wire. The prince has also introduced the use of a modification of the lobster-pot at great depths with complete success. The baited pot is sunk and attached to a buoyed line, with a light attached to the buoys. The ship lies near for twenty-four hours, and when the trap is hauled up, the animals in it are found in perfect preservation. From the habit of one animal preying on a fellow-captive, small net cells are provided in the interior in which the smaller specimens may take refuge. One such pot put over in the Mediterranean in 2230 metres came up with eighty-nine black ground-sharks, a species previously considered exceedingly rare. The greatest depth to which this trap has been used is 3610 metres. Along the coast near Mogador the surface-temperature of the water is lower than it is a few miles out at sea, as the result probably of the action of the north-east trade-winds causing an upwelling along the shore. The water along the shore is not only cold, but of a pure green colour, probably due to chlorophyll. During the fortnight spent in this region there was little wind, but a heavy swell, causing the ship to roll heavily. On July 21 the ship went out again after coaling at Gibraltar, and next day commenced working on the ridge discovered by the *Dacia* in 1883. Observations were made in the deep water north and south of the 50-fathom shoal, 600 miles south-west of the strait of Gibraltar, which showed that in the south channel at its deepest part the water from the surface to 110 fathoms was of Atlantic origin, but from that depth to the bottom (210 fathoms) it came from the Mediterranean, while a thin zone of mixed origin occurred between the two. In the north channel the Mediterranean water comes nearer the surface, but the proportion was practically the same. The sea-bed here and eastward toward the straits was everywhere rock. On July 27 the Gettysburg Bank, 360 miles due west of Gibraltar, was reached with a sounding of 185 metres, and the shoalest part found was 60 metres, or 33 fathoms. The ground was excessively rough; the lines attaching lobster-pots which had been put over to their buoys were repeatedly broken by the tidal current rubbing them against the rocks. A large number of fish was caught by the line on this shoal. Heavy weather prevented the observations from being continued, and the yacht returned to Lisbon, arriving on August 1. Off the Tagus the temperature of the surface water is comparatively low on account of the upwelling of cool water from great depths, a process of natural refrigeration very advantageous for the summer climate of that coast. The Tagus at Lisbon is practically pure sea-water renewed by the rapid tidal currents, and the river affects it little, except by rendering the surface muddy. On August 8 the *Princess Alice* sailed again to resume observations in the deep water north of the Burlings, which appears to be an isolated patch within the 100-fathom line descending to the depth of 900 fathoms. It was discovered by the Eastern Telegraph Company, on account of the trouble caused to their cables.

GENERAL.

Ice Control in Estuaries.—M. Maurice Dileos contributes to the April number of the *Revue Maritime et Coloniale* an interesting account of experiments on various methods of preventing the closing of navigation by ice in river-ports, docks, and estuaries, and of protecting vessels already enclosed. M. Dileos observes that rivers 10 to 25 feet in depth rarely freeze with temperatures higher than 5° Fahr. to 14° Fahr.; the Marne, Saône, Yonne, Loire, Meuse, and Seine never solidify with less than 22° to 25° of frost, although drift-ice is formed at 21° to 25° Fahr. in perfectly fresh water. Petroleum or other mineral oil is very effective in delaying congelation, but the danger of fire almost precludes its use. In tidal basins and docks the daily change of level is sufficient to break up the ice as long as the temperature remains much above zero, but with greater cold an ice-field is formed, which rises and falls with the tide. Once navigation is closed, efforts must be chiefly directed to preventing vessels being "nipped" or damaged by the movements of masses of ice in breaking up. M. Dileos shows that quite an extraordinary amount may be done by mechanical means alone in the way of clearing a channel, or at least a space round enclosed vessels. He also gives details as to the best means of laying down and igniting explosives. The results indicate great complexity in the effects produced on the ice directly and on the water underneath indirectly. It would seem that in inexperienced hands it is a comparatively simple matter to destroy a vessel and leave the surrounding ice-sheet almost intact.

OBITUARY.

The Right Honourable Sir Henry Austen Layard, G.C.B.

By Sir Frederic J. Goldsmid, K.C.S.I., C.B.

The death of Sir Henry Austen Layard, on July 5, in his seventy-eighth year, will have been noted with regret by others than his own countrymen. So prominent a diplomatist and so eminent an explorer could not fail to possess a European reputation; and the result of his labours in the department of archæological research alone must remain a rich legacy to the student of every nationality. He was born in Paris on March 5, 1817. His father, Mr. P. J. Layard, was son of Dr. Layard, Dean of Bristol. Originally intended to follow the legal profession, we find him attracted, in early life, towards pursuits of a less sedentary and restrictive character, and a long and important journey which he undertook in 1839 may be held to have determined his future career. The incidents of that journey were thus touched upon by the present writer, when reviewing the distinguished traveller's record of 'Early adventures in Persia, Susiana, and Babylon,' shortly after its publication in 1887:—

"The author's boyhood was passed in Italy, where he acquired a taste for the fine arts. At about sixteen he was sent to London to study law; and, after passing six years in the office of a solicitor and the chambers of 'an eminent conveyancer,' he formed the resolution of going to Ceylon to seek an opening at the Bar or in the Civil Service. A travelling companion was found for him in the person of Mr. Edward Ledwich Mitford, a gentleman some ten years his senior, who disliked sea-voyages, but was prepared to make any ventures by land. The two agreed to proceed together through Central Europe, Dalmatia, Montenegro, Albania, and Bulgaria to Constantinople; thence to cross Asia Minor to Syria and Palestine, continuing the journey eastward to Baghdad, from which city they believed they 'should be able to reach India through Persia and Afghanistan, and ultimately Colombo.' No ship or steamer was to be resorted to; all was to be *boná fide* land travel, 'except when passing over the narrow strait of Adam's Bridge.'

"The programme was not carried out as intended. The travellers left London in July, 1839. On the way Layard caught a fever, which developed at Constantinople into a gastric attack, and compelled him to keep his bed. After a course of sharp treatment, he recovered sufficiently to overtake his comrade at Mudania, south of the Sea of Marmora, but by boat. This deviation from the original plan of procedure was followed by a second temporary separation, for though they proceeded together to Jerusalem, Layard, on January 15, 1840, started alone for Petra, and did not rejoin Mitford until some few weeks later at Aleppo. Hence on March 18 they journeyed in company to Baghdad, arriving there on May 2. On June 2—pronounced by a Mulla, after consulting the Koran, to be a profitable day for commencing a journey—they joined a caravan outside the gates, and would have made their first march towards the Turco-Persian frontier, but a muleteer's wrangle, in which the 'Karwán-Báshi' was himself the principal performer, detained them near the city walls, and they did not fairly get away till the day following. Reaching Hamadan (Ecbatana) by the usual road through Karmánshah and Kangawár, they were kept in that town for nearly a month, owing to difficulties about the *firmán* requisite to enable them to follow their route eastward. Eventually, when the obstacles were removed, they were no longer to travel together, a new and this time permanent separation taking place. On August 8 they rode out to the village of Shaverin, where they dined with some French officers, and parted company—Mitford to take a long journey through the north of Persia to

Kandahar and India; Layard to return to Hamadan and make fresh attempts to find a passage through Eastern Persia into Sistan, and so on to the track of the other.

"Sir Henry's book may thus be divided into two parts: the first and shorter descriptive of his wanderings in Palestine and Syria during a temporary separation from his fellow-traveller; the second and longer relating his experiences in Ispahan and Central Persia, Susiana, the country of the Bakhtiyáris, and Turkish Arabia, when left to his own resources. A supplementary section may be added for the last two chapters, which bring events up to 1845, and treat of employment at Constantinople and in the provinces of European Turkey. It should be noted that the author purposely avoids narrating any joint adventures, on the plea that such narrative has been forestalled by Mr. Mitford's publication of his 'Land March from England to Ceylon.' . . . As for the original project of finding his way overland to India, he does not seem to have abandoned it until revisiting Baghdad in 1842, when the receipt of letters from England led him to turn his thoughts homeward. He had then written his memoir on Khuzistan, describing the country, inhabitants, and resources, with a view to showing the importance of establishing political and commercial relations with it; and he had induced an enterprising British merchant, established at Baghdad, 'to enter into communication . . . with some of the principal landowners of Shuster,' so as to bring about, if possible, an exchange of native local products with British manufactures. . . . From Hamadan, after Mr. Mitford's departure, Layard proceeded to Ispahan. He had hoped to avoid the usual road and keep close to the great hill range of Luristan, and at Burujird he had proposed to strike across the Bakhtiyári mountains to Shuster; but sickness and various other obstacles prevented the fulfilment of his wishes, and he was compelled to turn eastward and seek a more direct road through the Feridun district and Tehrun. At one village he had found a Georgian Christian colony established by Shah Abbas. The inhabitants had retained their native language and religion; their features differed from those of the surrounding populations; their women went unveiled, and many were 'strikingly handsome;' their gardens and orchards had a prosperous appearance. In another Christian village, Adun, the inconvenience he underwent from the curiosity of the native community leads our author to contrast their behaviour unfavourably with that of Musalmans. 'This may arise,' he says, 'from the inferior position which they hold, and from the ill treatment they have experienced for so many generations from their Mohammedan rulers.' At Ispahan Layard, suffering, on first arrival, from severe ague and dysentery, was hospitably received by, and remained for some days the guest of, M. Eugène Boré, a French gentleman and an accomplished Oriental scholar. That he afterwards removed his quarters to a 'ruined house' occupied by Mr. Burgess, an English merchant of Tabriz, must be attributed as much to the political complications of the day as to personal susceptibility. In any case he was detained, owing to the customary dilatoriness and evasions of Persian authorities and executives, for some five weeks before again resuming his journey.

"The murder of Dr. Forbes in Sistan had at this time become known at Ispahan, and the Mu'tamadu'd-daulah, then governor there, would not hear of an English traveller moving, with his authority, in that direction. There was no alternative, therefore, but to revert to the Shuster project. How this was put into execution, and the journeys that followed, will be found related in the eighth and remaining chapters of this book. Up to the point reached, indeed, there is no lack of romantic adventure. Further on the narrative may be said to bristle with exciting incident, and the narrator's life seems to have hung by a thread at many periods of his eventful history. He is in peril from robbers, treachery, sickness, wild beasts; he is robbed of horses, clothes, money; he is in prison, in want, undergoing sore trials, moral and physical."*

We have here sketched out Layard's first contributions to geographical knowledge in respect of Asiatic countries; but of the lands which he visited west of the Bosphorus, we can do no more than call attention to their names. These, however, will serve to indicate the extent of his wanderings. The two charming volumes to which our notice refers, although published in comparatively recent years—when the subject treated in their pages had grown old—were received with more than common favour by the many, and with grateful satisfaction by the few readers under whose review they came. They well deserve a conspicuous place in the higher-class books of travel. Later on, in 1842, after a rough experience of living among Arabs, Turks, Kurds, and Persians, Layard appeared at Constantinople, the bearer of despatches from H.M. Consul at Baghdad to H.M. Ambassador at the Porte, then Sir Stratford Canning. The latter, whose keen appreciation of character was not the least remarkable of his great diplomatic qualifications, was not long in utilizing the capacities of the new-comer, whose knowledge of the many tracts he had lately traversed rendered him an exceptionally capable adviser and referee on questions arising out of Oriental problems of the day. Among these was the definition of the disputed Turco-Persian frontier, to effect which an International Commission had been organized—the means of settling an untoward feud, designed and put in execution by our representative in Turkey. It was the ambassador's wish to recognize the services of his quasi-improvised assistant by the offer of an *attaché*-ship on his staff, but the measure was apparently distasteful to the Foreign Office; and in 1845 Layard was despatched—with such funds as his enlightened patron could get together, and supported by *firmáns* such as no foreign diplomatist was more likely than Sir Stratford Canning, from sheer personal influence, to obtain—to carry out the exploration of the site of Ancient Nineveh, according to the general outline of operations sketched by himself, on personal examination of the ground in the neighbourhood of Mosul. In the following year, the British Ambassador's *employé* was authorized to excavate, and export sculptures. His annual pay and current expenditure were provided out of the private resources of his chief.

Rarely has a salary of £200 per annum been more thoroughly and legitimately earned. After a brilliant campaign of archæological discovery, Layard returned to Europe in 1847, with a report of proceedings of so full and interesting a kind as to give him deserved celebrity, not only among his own countrymen, but throughout continental nations. Oxford at once acknowledged his work by conferring upon him the honorary degree of D.C.L. Even Downing Street relented towards him so far as to open, for his admission, a door into the *salons* of diplomacy; for, in the words of the Foreign Office List, he became "an unpaid *attaché* to the Embassy at Constantinople from November 2, 1847, to March 20, 1849," and received a nomination to accompany (though he did not actually join) Colonel Fenwick Williams to Erzerum, "while engaged in carrying out the details of the Turco-Persian Boundary Treaty." On April 5, 1849, we learn from the same source, he was appointed fifth-class paid *attaché* at Constantinople, "to enable him to carry out his researches in the valley of the Tigris, which appointment he held till February 11, 1852."

From this period, up to the day of his death—more than forty years—the record of his career may be understood from an enumeration of the official posts filled and honours received. He was elected Lord Rector of Aberdeen University in 1852, and sat as Member for Aylesbury from July, 1852, till March, 1857. Under-

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* *Athenæum*, December 24, 1887.

Secretary of State for Foreign Affairs for a few days in 1852, he was reappointed to that office in 1861, remaining in it until July, 1866. He was elected Member for Southwark in December, 1860, and re-elected November, 1868, in which latter year he was sworn a Privy Councillor, and made First Commissioner of Works and Buildings. In 1869 he was appointed Envoy Extraordinary and Minister Plenipotentiary at Madrid, and Special Ambassador at Constantinople *ad interim* in March, 1877. Later in this same year, he was appointed Ambassador Extraordinary and Plenipotentiary to the Sultan, receiving the Grand Cross of the Bath in the following March. In 1880 he retired from public life, and took up his residence at Venice, there to indulge those artistic tastes which he, from time to time, successfully displayed in contributions to art and literature. His best-known works, however, will always remain: 'Nineveh and its Remains;' 'Discoveries in the Ruins of Nineveh and Babylon;' 'The Two Series of the Monuments of Nineveh;' and the recollections of travel to which lengthy allusion has been made.

Perhaps no better tribute could be offered to Sir Henry Layard's memory than the following quotation from the *Quarterly Review* of January, 1849, when his early discoveries had been first known and appreciated by his countrymen at home: "We found in Mr. Layard, not merely an industrious and persevering discoverer in this new field of antiquities, but an Eastern traveller, distinguished we may say, beyond almost all others, by the freshness, vigour, and simplicity of his narrative; by an extraordinary familiarity with the habits and manners of these wild tribes, which might seem almost intuitive, but is, we soon perceive, the result of long and intimate acquaintance, and perfect command of the language. No one has shown in an equal degree the power of adapting himself—at once and completely, without surrendering the acknowledged superiority of the Frank—to the ordinary life of the Asiatic. Mr. Layard, without effort, teaches us more, and in a more light and picturesque manner, even than d'Arvieux. He seems as trustworthy, though far more lively and dramatic, than Burckhardt. It is hardly too much to say that the history of the excavations and revelations of his management of the Turkish rulers, of the wild chiefs whom the intelligence of his strange proceedings brought around him, of the labouring Arabs and Chaldeans whom he employed in his works, and the removal of the sculptures, with their embarkation on the Tigris, is as interesting as the discoveries themselves; while, during the necessary suspension of his toil among the ruins, we are content to follow him into the villages of Mohammedans, Nestorian Christians, devil-worshippers, as if these were the sole or primary object of his travels."

Rev. Edward Hale.

It is with much regret that we record the death of the Rev. Edward Hale, Senior Assistant Master at Eton College; it took place on July 25. Mr. Hale, who was sixty-six years of age, graduated at Emmanuel College, Cambridge, taking his B.A. degree in 1850. About the same year he was appointed Assistant Mathematical Master at Eton. Mr. Hale proceeded to M.A. in 1853, and eventually quitted the Mathematical School and became Science Master. Mr. Hale all along took a special interest in geography, and did what he could to give it a place at Eton, where it is recognized in the science examinations. He gave material advice and assistance to the Council of the Society (of which he was a Fellow for many years) in their efforts to raise the standard of geography in England, and promote its recognition in education. Mr. Hale was a man of the most genial disposition, and his death will be felt as a loss by all who knew him.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Astronomical Positions. **Weiss and Schramm.**

Astronomische Arbeiten des k. k. Gradmessungs—Bureau. Ausgeführt . . . von Prof. Dr. Edmund Weiss und Dr. Robert Schramm. V. Band. Längenbestimmungen. Vienna, F. Tempsky, 1893. Size 12½ × 10, pp. 190.

The difference in longitude between the centres of the domes of the Observatories in Vienna and Berlin is fixed as $11^m\ 46{\cdot}489^s$, and that between the centre of the Berlin Observatory dome and the centre of the Greenwich Observatory transit instrument as $53^m\ 34{\cdot}899^s \pm 0{\cdot}018$.

Austria—Tyrol. **Ogilvie.**

Coral in the "Dolomites" of South Tyrol. By Miss Maria M. Ogilvie, D.SC. [Extracted from the *Geological Magazine*, Decade iv. vol. i. Nos. 355–356, January and February, 1894.] Size 8½ × 5½, pp. 22. *Map and Diagrams. Presented by the Author.*

Miss Ogilvie finds that the evidence afforded by the fossil corals of the Dolomites tends to support Murray's theory of the origin of reefs rather than Darwin's. Beyond a description of the typical scenery of the district, Miss Ogilvie's paper is strictly geological, and in some respects controversial.

Azores. **Kettle.**

A Description of the Azores or Western Islands. To accompany the Chart. Fifteenth Edition. By William R. Kettle. London, R. H. Laurie, 1894. Size 8½ × 5½. *Presented by the Author.*

An excerpt from Findlay's 'Memoir of the North Atlantic Ocean.'

European Predominance. **Reclus.**

Elisée Reclus. Hégémonie de l'Europe. Edition de la Société nouvelle. 1894. Size 9½ × 6, pp. 13. *Presented by the Author.*

A discussion of the geographical reasons why Europe has gained and maintained its pre-eminence as the home of civilized man.

France—Meurthe-et-Moselle. **Bleicher.**

Le Minerai de Fer de Meurthe-et-Moselle, par M. Bleicher. Extrait du Bulletin de la Société industrielle de l'Est. Nancy, Berger-Levrault & Co., 1894. Size 10 × 6½, pp. 22. *Map and Plates. Presented by the Author.*

France—Paris. **Baedeker.**

Paris and Environs, with routes from London to Paris. Handbook for Travellers. With 12 Maps and 33 Plans. Eleventh revised Edition. Leipsic, Karl Baedeker. London, Dulau & Co., 1894. Size 6½ × 4½, pp. xl., 396, and 32. *Price 6 marks. Presented by Messrs. Dulau & Co.*

France—Vichy. **Dollfus**

Récherches géologiques sur les environs de Vichy (Allier). Par Gustave F. Dollfus. Paris, Comptoir Géologique de Paris, 1894. Size 11 × 7, pp. 65. *Plates. Price* 3 *fr.*

Germany. **Penck.**

Bericht der Central-Kommission für wissenschaftliche Landeskunde von Deutschland über die zwei Geschäftsjahre von Ostern, 1891 bis Ostern, 1893 von Prof. Dr. Albrecht Penck in Wien (Sonder Abdruck aus den Verhandlungen des X. Deutschen Geographentages in Stuttgart, 1893). Size 9½ × 6½, pp. 22. *Presented by the Author.*

Germany—Fichtelgebirge. **Lord.**

Ueber die Basalte des Fichtelgebirges. Inaugural-Dissertation zur Erlangung der Doktorwürde der hohen naturwissenschaftlich-mathematischen Fakultät der Ruprecht-Karls-Universität zu Heidelberg, vorgelegt von Edwin C. E. Lord aus Brooklyn-Heidelberg, 1894. Size 9 × 6, pp. 36. *Presented by the Author.*

Germany—Prussia. *Petermanns M.* 40 (1894): 160–165. **Supan.**

Die Nationalitäten der preussischen Monarchie nach der Zählung von 1890. Von Prof. Dr. A. Supan. *With Map.*

Iberian Peninsula. **Penck.**

Die Pyrenäen-Halbinsel. Reisebilder. Vortrag, gehalten den 8 November, 1893, von Albrecht Penck (Vorträge des Vereines zur Verbreitung naturwissenschaftlicher Kenntnisse in Wien xxxiv. Jahrgang Heft 1). Wien, 1894. Size 7½ × 5, pp. 40. *Presented by the Author.*

Lake of Constance. **Penck.**

Bericht über die Exkursion des X. Deutschen Geographentages nach Ober-Schwaben und dem Bodensee (10–14 April, 1893). Unter Mitwirkung von Eduard Brückner, Hermann Credner, E. Schuhmacher und Hans Thürach, Verfasst von Albrecht Penck, in Wien. (Sonderabdruck aus den Verhandlungen, etc.) Berlin, 1893. Size 9½ × 6½, pp. 10. *Presented by Professor Penck.*

Scotland—Northern Highlands. **Baddeley.**

Thorough Guide Series. The Northern Highlands (Scotland, Part II.), containing a full description of Aberdeen, Inverness, Loch Maree, and Gairloch, and of the mainland north of those places in the counties of Aberdeen, Banff, Elgin, and Nairn, Inverness, Ross, Cromarty, Sutherland, and Caithness. By M. J. B. Baddeley. Fifth edit. London, Dulau & Co., 1894. Size 6½ × 4½, pp. xix. and 145. *Maps and Plans. Price* 3*s.* 6*d. Presented by the Publishers.*

Switzerland—Basel. **Hotz.**

Basels Lage und ihr Einfluss auf die Entwicklung und die Geschichte der Stadt, von Dr. Rud. Hotz. Wissenschaftliche Beilage zum Bericht über das Gymnasium Schuljahr, 1893–94. Basel, 1894. Size 11½ × 9, pp. 28.

This memoir will receive special notice.

ASIA.

Chinese Atlas. *Rev. G. Italiana* 1 (1894): 417–422. ———

Cartografia dell'estremo Oriente. Un Atlante Cinese della Magliabechiana di Firenze, per Bernardino Frescura ed Assunto Mori.

Dutch East Indies. **Van der Chijs.**

Nederlandsch-Indisch Plakaatboek, 1602–1811, door Mr. J. A. Van der Chijs. Elfde Deel, 1788–1794. Batavia, 1893. Size 8½ × 5½, pp. 903.

Dutch East Indies. **Van der Chijs.**

Dagh-Register gehouden int Casteel Batavia vant passerende daer ter plaetse als over geheel Nederlandts-India, Anno 1664. Uitgegeven door het Bataviaasch Genootschap van Kunsten en Wetenschappen, met medewerking van de Nederlandsch-Indische Regeering en onder toezicht van Mr. J. A. Van der Chijs. Batavia, 1893. Size 11 × 7½, pp. 632.

India—Amritsar District. ———

Gazetteer of the Amritsar District, 1892–93. Revised Edition. Compiled and published under the authority of the Punjab Government. Size 10 × 6½, pp. viii., 172, and xlvi. *Presented by the Secretary of State for India.*

This gives a thoroughly revised and largely rewritten account of the Amritsar district, dealing with all the geographical and economical conditions of the region.

India—Gohna Lake. *Records Geol. Surv. India* 27 (1894): 55–64. **Holland.**

Report on the Gohna Landslip, Garhwal. By Thomas H. Holland.

This report, which is well illustrated with photographs and diagrams, was noticed in the *Journal* for August, vol. iii. p. 162.

India—Waterworks. **Clerke, Sadasewjee, Jacob.**

Min. P.I. Civil Engineers 115 (1894): 12–62.

The Tansa Works for the Water-Supply of Bombay. By W. J. B. Clerke.
The Baroda Waterworks. By J. Sadasewjee.
The Water-Supply of Jeypore, Rajputana. By Colonel S. S. Jacob.

These papers, which are illustrated by diagrams and some views, are of special interest on account of the peculiar difficulties which have to be overcome in taking advantage of the brief rainy season for collecting and in contending against evaporation during the storage and transport of the water.

Indian Marine Surveys. **Oldham.**

Administration Report of the Maritime Survey of India for the official year 1893–94. By Commander Cecil F. Oldham, R.N. Bombay, 1894. Size 13½ × 8½, pp. 14. *Presented by the Marine Survey of India.*

The work recorded in this report will be referred to in a special note.

Kalyani Inscriptions. **Sein-Ko.**

A Preliminary Study of the Kalyani Inscriptions of Dhammacheti, 1476 A.D. By Taw Sein-Ko. Reprinted from the *Indian Antiquary*. Bombay, 1893. Size 11½ × 9, pp. 60. *Plates.*

Malay Archipelago. *B.G.S. California* 2 (1894): 13–42. **Everill.**

The Malay Archipelago. By Captain Henry Chas. Everill. *Illustrations.*

Malay Archipelago—Java. **Bastian.**

Indonesien oder die Inseln des Malayischen Archipel, von A. Bastian. V. Lieferung, Java und Schluss. Berlin, J. Dümmler, 1894. Size 10½ × 7, pp. vii. and 135. *Plates.*

This concludes Professor Bastian's latest work on the Malay Archipelago, giving an account of the history of the archipelago, especially Java, and of the religious changes, illustrated by the reproduction of a series of ancient paintings.

Malay Archipelago—Sumatra. **Brenner.**

Besuch bei den Kannibalen Sumatras. Erste Durchquerung der unabhängigen Batak-Lande von Joachim Freiherr von Brenner. Würzburg, Leo Woerl, 1894. Size 11 × 7½, pp. iv. and 388. *Price* 10*s.* *Maps and Illustrations.*

A valuable work which will be separately noticed.

Russian Central Asia. *Ann. G.* 3 (1894): 346–370, 467–488. **Blanc.**

La Colonisation russe en Asie centrale, par M. E. Blanc.

An account of Russian enterprise in the trans-Caspian district, with particulars of the efforts being made to promote irrigation agriculture, especially cotton-growing in Turkistan.

Sinaitic Peninsula. *Le Globe* 33 (1894): 99–125. **Ehni**

Souvenirs du Mont Hôr et des ruines de Petra, par M. Jacques Ehni, Dr. Phil.

Siberia. **Martin.**

En resa i vestra Sibirien utford år 1891 med understöd af Vegastipendiet af J. R. Martin. [From *Ymer*, 1892.] Size 9 × 6½, pp. 70. *Presented by the Author.*

Tibet. **Marston.**

The Great Closed Land. A Plea for Tibet. By Annie W. Marston, with Preface by Rev. B. La Trobe. London, S. W. Partridge & Co., n.d. [1894]. Size 9 × 7½, pp. 112. *Map and Illustrations.*

This volume is written mainly with the object of arousing Christian sympathy for Tibet. Chapter I. contains a brief account of the attempts of various travellers to enter the land; succeeding chapters deal with the country, its government, the people, and their religions, and the efforts made by various missionary bodies to settle in the country.

AFRICA.

Egypt—Nile. *J.R.I. British Architects* (3) 1 (1894): 573–582. **Whitehouse.**

Nile Reservoirs: the Fayoum and Rayan-Moeris. By Mr. Cope Whitehouse.

A richly illustrated paper pointing out the defects of the Nile reservoir scheme, and the various advantages of a reservoir in the Wady Rayan.

Egypt—Wady Rayan. **Schweinfurth.**

Translation of a Note by Dr. Schweinfurth on the Salt in the Wady Rayan. Size 13 × 9½, pp. 9.

Egyptian Dialects. **Seidel.**

Praktisches Handbuch der Arabischen Umgangssprache ägyptischen Dialekts. Mit zahlreichen Uebungsstücken und einem ausführlichen ägyptoarabisch-deutschen Wörterbuch, von A. Seidel. Berlin, Gergonne & Cie. [1894]. Size 9½ × 6, pp. vi. and 310. *Presented by the Publishers.*

A handbook of the dialect of Arabic spoken in Egypt, arranged in a practical manner as an aid to the acquisition of the language by students, containing a grammar, reading exercises, and vocabulary; the Arabic words are given in Roman type.

French Sudan. *Quarterly R.* 179 (1894): 264–287. ———

The French Sudan.

This article gives a clear summary of the history and progress of French influence in the western Sudan.

Liberia. *Ann. G.* 3 (1894): 489–498. **Rouire.**

Délimitation de la République de Libéria. Par M. C. Dr. Rouire.

An account of the changes in area of Liberia, illustrated by a map showing the present outline of the colony and its successive restrictions in area. The paper is followed by a bibliography of Liberia.

North Africa. **Rainaud.**

Quid de Natura et fructibus Cyrenaicæ Pentapolis Antiqua Monumenta cum recentioribus collata nobis tradiderint. Thesim facultati litterarum Parisiensi proponebat A. Rainaud. Paris, A. Colin, 1894. Size 10 × 6½, pp. 138. *Map. Presented by the Author.*

Somali-land. *M.G. Ges. Wien.* 37 (1894): 337–383. **Hoyos.**

Meine und Graf Richard Coudenhove's Reise nach dem Somali-Lande. Von Ernst Graf Hoyos, jun.

This paper is referred to in the Monthly Record.

NORTH AMERICA.

Alaska. **Klotz.**

Alaska. By Otto J. Klotz, of the Alaska Boundary Survey. Reprinted from the *Ottawa Naturalist* for April, 1894. Size 9 × 6, pp. 28. *Presented by the Author.*

A popular general sketch.

Canada. **Baedeker.**

The Dominion of Canada, with Newfoundland and an excursion to Alaska. Handbook for Travellers. By Karl Baedeker. Leipsic, Karl Baedeker. London, Dulau & Co. Size 6½ × 4½, pp. lxii. and 254. *Maps. Price 5s. Presented by Messrs. Dulau & Co.*

Mr. J. T. Muirhead, who last year wrote 'Baedeker's Handbook to the United States,' has now produced a very compact guide to Canada which cannot fail to be of the greatest service to tourists, who have learned to like and trust these handbooks. There is a plentiful supply of maps, and excellent introductory matter by good authorities on the geography, history, and institutions of Canada.

Canada—Hudson Bay. **Schultz.**

Transaction No. 47, The Historical and Scientific Society of Manitoba. A Forgotten Northern Fortress. By Hon. John Schultz. Winnipeg, 1894. Size 9 × 6, pp. 14. *Map and Illustrations. Presented by the above Society.*

A history and description of Fort Prince of Wales, Churchill Harbour, Hudson Bay.

Canada—Manitoba. **Bryce.**

Transaction No. 46, The Historical and Scientific Society of Manitoba. Early Days in Winnipeg. By George Bryce, LL.D. Winnipeg, 1894. Size 9 × 6, pp. 8. *Illustrations. Presented by the above Society.*

Contains sketches of Winnipeg in 1869 and in 1871.

Manitoba. **Schultz.**

Transaction No. 45, The Historical and Scientific Society of Manitoba. The Old Crow-Wing Trail. By Hon. John Schultz, M.D. Winnipeg, 1894. Size 8½ × 6, pp. 32. *Illustrations. Presented by the Historical and Scientific Society of Manitoba.*

An account of the old Crow-wing route to Fort Garry (Winnipeg) from St. Paul (Minnesota), which has now been obliterated by the cultivation of the country, but was traversed by Dr. Schultz in 1860. The paper contains views of Winnipeg in 1860 and at the present day.

Mississippi Valley. *Report Smithsonian I.* **1891** (1893): 503–599. **Carr.**

The Mounds of the Mississippi Valley historically considered. By Lucien Carr.

This is reprinted from the *Memoirs* of the Kentucky Geological Survey, vol. ii., 1883.

United States. **Ratzel.**

Die Vereinigten Staaten von Amerika. Von Dr. Friedrich Ratzel. Zweiter Band. Politische und Wirtschafts-Geographie. Zweite Auflage. München, R. Oldenbourg, 1893. Size 10 × 7, pp. xiv. and 763. *Map. Price* 15*s.*

This volume deals with the economic geography of the United States, treating of the land with regard to elevation, soil, and climate; of the people—especially the effects of the juxtaposition of different races—the distribution and movements of population, the resources of the country in agricultural produce, minerals, manufactures, and means of transport and external trade. Finally, the government, religions, intellectual, and social life of the people are considered in a series of chapters.

United States—California. **Lawson.**

The Post-Pliocene Diastrophism of the Coast of Southern California. By Andrew C. Lawson. University of California, Bulletin of the Department of Geology. Vol. i. No. 4, pp. 115–160, pls. 8–9. Berkeley, 1893. Size 10½ × 7.

United States—California—Point Bonita. **Ransome.**

The Eruptive Rocks of Point Bonita. By J. Leslie Ransome. University of California, *Bulletin* of the Department of Geology. Vol. i. No. 3, pp. 71–114, pls. 6–7. Berkeley, 1893. Size 10½ × 7.

Point Bonita forms the southern extremity of Marin County, California, being the most westerly headland on the north shore of the entrance to San Francisco Bay.

CENTRAL AND SOUTH AMERICA.

Argentine—Cordoba. *B.A. nacional Ciencias, Cordoba* **12** (1890): 5–54 **Bodenbender.**

La Cuenca del Valle del Rio 1° en Córdoba. Descripcion geologica del Valle del Rio 1° desde la Sierra de Córdoba hasta la Mar Chiquita, por Guillermo Bodenbender.

The memoir is illustrated by a geological map of the river valley and a series of sections printed in colours.

Central American Place-Names. *Globus* **66** (1894): 90–96. **Sapper.**

Indianischer Ortsnamen im nördlichen Mittelamerika. Von Dr. Karl Sapper, Coban.

This paper on place-names in Central America will be separately noticed. It is accompanied by a map showing the limits within which place-names belonging to the different native languages are found.

Chile—Tarapaca. **Billinghurst.**

La Irrigación en Tarapacá, por Guillermo E. Billinghurst. Santiago de Chile, 1893. Size 10½ × 7, pp. 193. *Maps and Plates.*

Colombia. **Reclus and Vergara.**

Eliseo Reclus. Colombia. Traducida y anotada con autorizacion del Autor por F. J. Vergara y Velasco. Edicion oficial. Bogota, 1893. Size 8½ × 5½, pp. xxxii. and 440. *Presented by the Author.*

This is a Spanish translation with additions and notes of the chapter on Colombia in the last volume of Reclus' *Geographie Universelle*, but unaccompanied by illustrations, and with a very poor sketch by way of apology for a map.

Dutch Guiana. *Tijdschr. Nederlandsch. Aardrjksk. Genoots.* **10** (1893): 73–87. **Loth.**

Verslag van eene reis naar de Lawa tot het verkennen van het terrein tusschen die rivier en de Tapanahoni en van dat tusschen de Toso- en de Sara-kreek, gedaan van Januari tot Mei, 1892. Door W. L. Loth. *With Map.*

Guatemala. ——

Demarcación politica de la República de Guatemala. Compilada por la Oficina de Estadística, 1892. Guatemala, 1893. Size 10½ × 7, separately paged. *Presented by the Government of Guatemala.*

A useful book of reference containing particulars of all the political divisions and subdivisions of Guatemala, and, which is most valuable, an alphabetical list extending to 147 pages of all the place-names in the Republic.

South America—East Coast. ——

No. 88. U.S. Hydrographic Office. East Coast of South America, from the Orinoco River to Cape Virgins, including Falkland, South Georgia, Sandwich, and South Shetland Islands. Second Edition. Washington, 1894. Size 9 × 6, pp. ix. and 492, index chart. *Presented by the U.S. Hydrographic Office.*

Venezuela—La Guaira. **Punchard and Houston.**

Min. P.I. Civil Engineers **115** (1894): 332–342.

La Guaira Harbour Works. By William Charles Punchard and James Lennox Houston.

AUSTRALASIA.

Aborigines. **Cunow.**

Die Verwandtschafts-Organisationen der Australneger. Ein Beitrag zur Entwicklungsgeschichte der Familie, von Heinrich Cunow. Stuttgart, J. H. W. Dietz, 1894. Size 10½ × 6½, pp. viii. and 190. *Presented by the Author.*

Primitive peoples like the Australian aborigines reveal so many of the first impulses and processes of the growth of civilization, that it is very important to subject their manners and customs to the closest scientific scrutiny before the effacing influences of contact with outsiders has done its work. The author treats of the origin and development of the clan system and of the various social divisions and theory of kinship in different Australian tribes, comparing them with other primitive peoples, and critically considering the bearing of the facts he has elucidated on various anthropological theories.

Australia—Artesian wells. *J. & P.R.S. New South Wales* **27** (1893): 408–442. **David.**

Notes on Artesian Water in New South Wales and Queensland (Part II.). By Prof. T. W. E. David.

In the same journal (pp. 466–468) there is a paper by Mr. W. A. Dixon on "Artesian Water in Connection with Irrigation."

Australian Handbook. **Gordon and Gotch.**

The Australian Handbook (incorporating New Zealand, Fiji, and New Guinea), Shippers' and Importers' Directory and Business Guide for 1894. London, Gordon and Gotch, 1894. Size 10 × 6½, pp. 624. *Maps, Plans, and Plates.*

The value of this standard Year-Book is so well understood that it is sufficient to note the fact that the present is the twenty-fifth annual publication.

Dutch New Guinea. **Clercq.**

Tijdschr. Nederlandsch. Aardrijksk. Genoot. 10 (1893): 151-219, 438-465, 587-649, 841-884, 981-1021.

De West-en Noordkust van Nederlandsch Nieu-Guinea. Proeve van beschrijving volgens de Mededeelingen en rapporten van reizigers en Ambtenaren en naar eigen Ervaringen. Door F. S. A. de Clercq.

An authoritative account of recent occurrences in Dutch New Guinea, serving as a supplement to Robidé van der Aa's great work, which was published in 1879. A map of the north-west part of New Guinea and sketch-maps of parts of the territory are given, as well as views. Full descriptions of people and language, taken by districts, form a considerable proportion of the work. It concludes with an alphabetical index.

New South Wales—Barrier Ranges. **Jaquet.**

Department of Mines and Agriculture. Memoirs of the Geological Survey of New South Wales. Geology, No. 5. Geology of the Broken Hill Lode and Barrier Ranges Mineral Field, New South Wales, with Maps, Plates, and Sections. By J. B. Jaquet. Sydney, C. Potter, 1894. Size 12 × 10, pp. ix. and 149. *Maps, Sections, and Plates.*

Chapter II. of this Memoir deals with the Physical Geography and Meteorology of the district described.

New South Wales—Irrigation. **McKinney.**

J. & P.R.S. New South Wales 27 (1893): 384-400.

The Progress and Position of Irrigation in New South Wales. By H. G. McKinney.

POLAR REGIONS.

Spitzbergen, etc. **Bienaimé and others.**

Nouvelles Archives Missions Scientifiques 5 (1893): 1-264.

Voyage de "la Manche" à l'Ile Jan-Mayen et au Spitzberg (Juillet-Août, 1892).

Captain Bienaimé, who was in command of the expedition, contributes a narrative of the voyage, M. R. de Carfort summarizes the hydrographical work and discusses the tides, glacier observations, and meteorology. Magnetic and gravity observations are described by other members of the expedition, and the zoological, botanical, and geological collections are described by specialists. There are numerous maps and a set of finely reproduced photographs.

Spitzbergen, etc. *B.S.G. Paris* 15 (1894): 5-69. **Rabot.**

Explorations dans l'Ocean Glacial Arctique. Islande—Jan Mayen—Spitzberg, par M. Charles Rabot.

M. Rabot here gives a detailed account of his two summer cruises in high latitudes, undertaken in 1891 and 1892.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Agronomic Maps. *C.R.* 118 (1894): 1167-1170. **Gatellier.**

Carte agronomique du canton de la Ferté-sous-Jouarre. Note de M. Gatellier.

Agronomic maps are intended to supply detailed practical information regarding the suitability of soil for agricultural purposes. They are based on large-scale geological maps, and have additional information placed on them regarding the mechanical and chemical composition of the soil to serve as a guide to farmers for the proper fertilizers to apply to the land. This additional information is obtained by a large number of analyses of samples carefully selected. The sheets of the communes already prepared show, as might be expected, an intimate relation between the character of the soil and that of the underlying rocks.

Biological Distribution. *Report Smithsonian I.* 1891 (1893): 365-415. **Merriam.**

The Geographic Distribution of Life in North America. With special reference to the mammalia. By C. Hart Merriam, M.D.

This is reprinted from the *Proceedings* of the Biological Society of Washington, vol. 7.

Continental origins. *J. of Geol.* 2 (1894): 383-395. **Upham.**

Wave-like progress of an Epeirogenic Uplift. By Warren Upham.

The word *epeirogenic* was introduced by Gilbert to signify the broad movements of uplift or sinking which affect a whole continent, as distinguished from the sharper orogenic movements which produce mountain ranges. A study of the evidences for uplift in North America since the last Ice-age leads Mr. Upham to conclude that it was "an effort of the Earth to regain a state of isostasy, or flotation of the crust on the heavier mobile interior, which is capable of flow, whether it be solid or molten."

Elevation of Land. **Sieger.**

Seenschwankungen und Strandverschiebungen in Skandinavien von Dr. Robert Sieger, in Wien. Mit einer Tafel und 28 Zifferntabellen. Sonderabdruck aus der Zeitschrift der Gesellschaft für Erdkunde zu Berlin, xxviii. Band, 1893, No. 1 und 6. Berlin, 1893. Size 9 × 6, pp. 202. *Presented by the Author.*

This work was noticed in the *Journal*, vol. ii. p. 262.

Figure of the Earth. *Report Smithsonian I.* **1891** (1893): 127–153. **Chree.**

Some Applications of Physics and Mathematics to Geology. By C. Chree.

As geographers we are grateful to the Smithsonian Institution for culling from various sources and reprinting in an accessible form such papers as this of Mr. Chree's, the permanent value of which may be taken as well established. It originally appeared in the *Philosophical Magazine* for 1891, vol. 32, p. 233.

Forest Growth. *National G. Mag.* **6** (1894): 127–148. **Fernow.**

The Battle of the Forest. By B. E. Fernow.

A plea for forest culture concluding, "While man may *study* the geography of the Earth as it exists, here is about the only opportunity for him to *make* geography, to shape the surface conditions of the Earth, and even to some extent influence its climatic conditions."

Geodesy. **Hirsch.**

Comptes-Rendus des Séances de la Commission Permanente de l'Association Géodésique internationale, réunie a Genéve du 12 au 18 Septembre, 1893. Rédigés par le Secrétaire perpétuel A. Hirsch. Suivis des Rapports sur les travaux géodésiques accomplis dans les différents pays pendant la dernière année. Avec 21 cartes et planches. Berlin, Georg. Reimer, 1894. Size 11½ × 9, pp. 194.

Geodesy. *Rev. G. Italiana* **1** (1894): 293–305. **Viezzoli.**

Gli odierni studii sulla figura della Terra, del Prof. Francesco Viezzoli.

A compilation stating the steps which have led to the modern views of the figure of the Earth.

Geodesy. **Rosén.**

Projet de Mesure d'un Arc du Méridien de 4° 20′ au Spitzberg, par P.-G. Rosén. Stockholm, P. A. Norstedt & Sons, 1893. Size 10 × 7, pp. 31. *Map. Presented by the Author.*

The proposition to measure a long arc of the meridian nearer the pole than has ever previously been attempted is one that should be warmly received by all geographers, on account of its important bearing on the exact figure of the Earth. M. Rosen shows that the scheme is perfectly practicable.

Geology. *J. Manchester G.S.* (1892): 226–230. **Dawkins.**

Geology in Relation to Geography. By Professor W. Boyd Dawkins.

Glacial Cañons. *J. of Geol.* **2** (1894): 350–364. **McGee.**

Glacial Cañons. By J. W. McGee.

A theoretical paper on the excavatory power of ice, founded on practical observations in the Sierra Nevada. The conclusion arrived at is that the invasion of a water-cut cañon by ice would suffice to alter all the characteristic features into those of glacial origin. "It follows that these features do not necessarily imply extensive glacial excavation, or indicate that glaciers are superlatively energetic engines of erosion."

Gulf Stream. *Report Smithsonian I.* **1891** (1893): 189–206. **Agassiz.**

The Gulf Stream. By Alexander Agassiz.

This is reprinted from the *Bulletin* of the Museum of Comparative Zoology at Harvard College, vol. 14, chap. 9. It is illustrated by historical and other maps and by diagrams.

Land-forms. *Rev. G. Italiana* 1 (1894): 33–51. **Borzino.**

La Linea di Displuvio. Contributo allo studio della Geografia Fisica. Ten. Colonn. C. Borzino.

A treatise on the form of land-surfaces, with special reference to the slopes of mountain and valley sides as determined by rain-washed material.

Mathematical and Physical Geography. **Klein.**

Jahrbuch der Astronomie und Geophysik. Enthaltend die wichtigsten Fortschritte auf den Gebieten der Astrophysik, Meteorologie und physikalischen Erdkunde. Herausgegeben von Dr. Hermann J. Klein. IV. Jahrgang, 1893. Leipzig, E. H. Mayer, 1894. Size 9 × 6, pp. viii. and 360. *Plates. Price 7s.*

This contains good summaries of many of the more important memoirs published in 1893.

Meteorology. **Bezold.**

Deutsches Meteorologisches Jahrbuch für 1890. Ergebnisse der Meteorologischen Beobachtungen im Jahre, 1890. Herausgegeben von dem königlich Preussischen Meteorologischen Institut durch Wilhelm von Bezold, Direktor. Heft III. Berlin, A. Asher & Co., 1893. Size 13 × 10. *Map, etc.*

Oceanography. *Scottish G. Mag.* 10 (1894): 281–302, 352–359, 413–427. **Pettersson.**

A Review of Swedish Hydrographic Research in the Baltic and the North Seas. By Otto Pettersson. *With Plates.*

The first three instalments of this magnificent memoir deal with the methods by which the investigation is being carried on, and with the resulting discovery of the extent and movement of the Baltic Current in the Skagerak and North Sea, with the thermal conditions of the water at different periods and the meteorological results.

Oceanography—Baltic. **Krümmel.**

Neue physikalische Untersuchungen aus der Ostsee. Von Professor Dr. O. Krümmel. Sonder-Abdruck aus den "Mittheilungen der Sektion für Küsten- und Hochsee-Fischerei." Nr. 6. Juni, 1894. Size 10 × 6½, pp. 10. *Presented by the Author.*

A popular paper on recent oceanographical work in the Baltic and eastern part of the North Sea.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

British Isles. **Inglis.**

The "Exeter Road" Map, London to Salisbury and Exeter. Compiled by H. R. H. Inglis. Half an inch to a stat. mile. *Price* 1s.

The Land's End to John o' Groats Map—Land's End to Worcester and Birmingham. 2 parts. Compiled by H. R. H. Inglis. Half an inch to a stat. mile. *Price* 2s. each part.

"The Safety" Cycling Map of Scotland. Edited by H. R. H. Inglis. 10 stat. miles to an inch. Gall and Iuglis, London. *Presented by the Publishers.*

England and Wales. **Ordnance Survey.**

Publications issued since July 8, 1894.

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Plymouth and its Environs, CXXIII. **11**, 7, 2*s.* 6*d.*

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Middlesborough (Yorkshire), VI. **10**, 1; VI. **11**. 11, 16, 19, 20, 21, 22, 23, 24, 25; VI. **12**, 16, 17, 20, 21, 22, 24, 25; VI. **14**, 7; VI. **15**, 1, 2, 3, 4, 5, 6, 7. 11, 12; VI. **16**, 1, 2, 5. This town is now complete in 73 sheets, 2*s.* 6*d.* each. Index, 6*d.*

Plymouth and Environs (Revision), CXXIII. 7, 19; CXXIII. **11**, 8, 10, 5; CXXIII. **12**, 6, 10, 13, with houses stippled.

(*E. Stanford, Agent.*)

Harrogate. **Bartholomew.**

Plan of Harrogate, with Environs. By J. Bartholomew, F.R.G.S. London, W. H. Smith & Son. *Price 2s., mounted on cloth*, 1894. *Presented by the Author.*

This map consists of two parts on one sheet. The first is a plan of Harrogate, drawn on the scale of eight inches to the mile; and the second is a reduction of the Ordnance Survey, to the scale of four miles to an inch, of the environs of Harrogate.

Scotland. **Bartholomew.**

Bartholomew's Reduced Ordnance Survey for Tourists and Cyclists. Scale 1 : 126,720 or 2 stat. miles to an inch. Sheet 5. Hawick and Borders. J. Bartholomew & Co., Edinburgh. *Price 2s., mounted on cloth. Presented by the Publishers.*

This map belongs to Bartholomew's reduced Ordnance Survey series. The relief is shown by a combination of orographic colouring and contouring, the heights above sea-level being also given in figures. All means of communication are laid down, main driving roads being coloured brown; footpaths and bridle-paths are indicated. The clear style in which this map is drawn, and the large amount of information it contains, combine to make it peculiarly suitable for the use of tourists and pedestrians.

ASIA.

China, Japan, and Korea. **Bartholomew.**

Bartholomew's Special War Map of China, Japan, and Korea. Scale 1 : 6,000,000 or 94·6 stat. miles to an inch. With Insets. J. Bartholomew & Co., Edinburgh, 1894. *Presented by the Publishers.*

At the present time, when public attention is directed to the Far East, in consequence of the war between China and Japan, there will no doubt be a considerable demand for a cheap map which can be used for reference in connection with the newspaper reports of the movements of the land and sea forces of the contending nations, and it is to meet this want that the map under notice has been published. It contains the eastern portion of the Chinese Empire, Korea, Japan, and the southern portion of the Russian territory bordering on Manchuria, and Korea. A very nice little map of Asia is given as an inset, as are also plans of the mouth of the Canton river, Hong-Kong, Shanghai, Pekin, and Tokio Bay.

China, Korea, and Japan. **Philip.**

Special War Map of China, Korea, and Japan. Compiled from the most recent and authentic sources. Scale 1 : 4,380,000 or 69·1 stat. miles to an inch. George Philip & Son, London & Liverpool. *Price* 1*s*.

AFRICA.

Sahara. **Vuillot.**

Carte du Sahara et du Nord-Ouest de l'Afrique de la Méditerranée au Sénégal et au Lac Tchad. Dressée par P. Vuillot. Scale: 1 : 4,000,000 or 63·6 stat. miles to an inch. A. Challamel, Paris. *Price* 5 *francs*.

All the most recent and reliable material has been used in the compilation of this map. The hill shading is in brown, water blue, and the caravan routes, wells, etc., are clearly indicated.

ARCTIC REGION.

Greenland. **Peary.**

Carta Speciale delle Regioni Artiche tra il Canale di Smith, il Mare di Lincoln e la Baia Independence; specialmente secondo i rilievi eseguiti dalle Spedizioni Polari dirette da C. F. Hall, 1871–72; G. S. Nares, 1875–76; A. W. Greely, 1881–84; R. E. Peary, 1891–92. Redatta in base alle Carte Idrografiche Americane ed Inglesi ed a numerosi altri documenti dal Prof. Guido Cora. Scale 1 : 1,525,000 or 24·6 stat. miles to an inch. Estratto dal Cosmos di Guido Cora. Serie II. Volume XI. (Torino, 1892–93). Fascicolo XII. Torino: Fratelli Bocca, 1894.

The results of Peary's explorations in the north of Greenland are laid down on this map, in the compilation of which the charts of the British and American Hydrographic Offices have been used. It is nicely drawn, and is accompanied by letterpress.

PHOTOGRAPHS.

Beira Railway. **Britton.**

44 photographs of the Beira Railway, taken by A. C. Britton, Esq. *Presented by J. Batalha-Reis, Esq.*

This is a series of views taken at different positions on the Beira railway. They convey a very good idea of the country through which the line passes, and manner in which the railway has been constructed.

Sikkim and Nepal. **Johnston and Hoffmann.**

93 photographs of Sikkim and Nepal, by Messrs. Johnston and Hoffmann, of Calcutta and Darjiling. *Presented by Messrs. Johnston and Hoffmann.*

This is a further contribution to the valuable series of photographs which have been presented to the Society by Messrs. Johnston and Hoffmann, of Calcutta and Darjiling. In the present donation there are 19 photographs of scenery in Nepal which are of special value, as there are no others of this country in the Society's collection. All of the views are well chosen, and they are beautiful specimens of photography.

Swaziland and Tongaland. **Allan.**

45 photographs of Natives and Scenery in Swaziland and Tongaland, taken by George Allan, Esq., J.P. *Presented by George Allan, Esq., J.P.*

These interesting photographs have been taken by Mr. Geo. Allan, during the past two years, while travelling in Swaziland and Tongaland. They include types of natives, kraals, and scenery, and are good specimens of photography.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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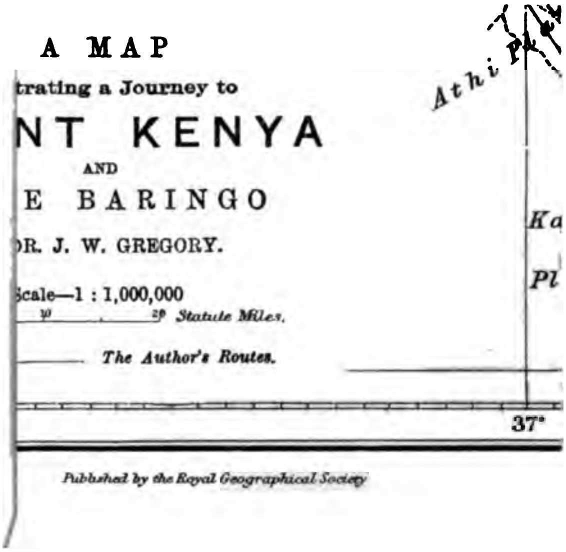

The

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MONTENEGRO AND ITS BORDERLANDS.*

By W. H. COZENS-HARDY, M.A.

In bringing to the notice of the Geographical Society Montenegro and its Borderlands, it is with some degree of diffidence that I hazard the suggestion that on a district of Europe it is possible to say "anything new that is true, or anything true that is new." I feel bound, moreover, to apologize for drawing attention to the fact that this Society, after more than half a century's existence, has not rendered my task impossible by having already performed it. But this fact is not to be evaded; and it supplies the reason—may it also be the excuse?—for a paper on Montenegro and its Borderlands. The district, then, is still, to all intents and purposes, unknown. Maps, if they exist at all, are chiefly interesting as imaginative studies. Mountains are marked with a vagueness which scorns details; islands appear where no islands are; rivers which run south on the map, run north in reality. But the interest of this region is not confined to its topography. The politician here has many an enigma to unravel. Ethnography can find no greater variety of races, no more curious manners and customs; while ballad and epic verse—still in process of growth—may attract the student of literature.

The more immediate object of my third visit to Montenegro last year was to find the solution of a problem which had for some time perplexed me; namely, what had become of the Montenegrin frontier since the treaty of Berlin. Blue books were silent on the subject; the Foreign Office had no information. The original European Commission had settled the Eastern frontier between the Lake of Scutari and the sea, had surveyed some part of the frontier to the north, and had then adjourned *sine die*, without completing its labours. Rumour suggested that the various powers concerned had been busying themselves in tinkering their respective frontiers on their own account. My own fascination for this problem is not shared, I imagine, by every one. I may, however, say that a fortunate combination of circumstances enabled me to find its solution, and to fill up the gap in the political geography of this region, at any rate, to my own satisfaction. To my own faith in the merits of this solution I will not attempt to make converts in this paper. I would rather give some general account of the countries and their peoples; and, in the first place, of Montenegro.

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* Paper read at the Royal Geographical Society, March 12, 1894. Map, p. 480.

The chief interest of the voyage down the Dalmatian coast consists in the relics of Roman and Venetian splendours with which it is lined, and the magnificent scenery of that Austrian fjord, the Bocche di Cattaro. From Cattaro, the last Dalmatian town, the road to Montenegro winds up the steep mountain side in endless zigzags. Above these, soon after crossing the Montenegrin frontier, the view extends over the Bocche di Cattaro and the Herzegovinian mountains on the one side, and the Adriatic coast on the other; and at night, when the shore lights are reflected in the water 3000 feet below, the impression is most striking. In a moment, however, the scenery changes. Turning the corner, there opens out a large rocky basin, completely shut in by limestone mountains. Imagine a circle of hills rising 400 feet all round; the rocks bare and grey, except where a few stunted beech or oak trees break the monotony. Let these hills enclose a floor of earth, in which a few crops are visible. Scatter over the flat ground and on the slopes of the hills, at intervals of a quarter of a mile, a few one-storied, one-doored, one-windowed huts, the walls of stone, the roofs of straw. The result is the characteristic Montenegrin village in the characteristic Montenegrin landscape. Diminish the size of the hills; decrease the area of the ground they enclose; put in patches of maize the size of a tablecloth, and potato-fields no bigger than a handkerchief; combine hundreds of these side by side at elevations of 2000 to 3000 feet; connect them by tracks three feet broad, winding over limestone boulders, and covered with a loose, sliding surface of limestone blocks of all sizes;—there you have Montenegro. Water is nowhere to be seen. There are only two rivers in the country. The principal one—the Zeta—disappears into a chasm on the plain of Nikšić, and reappears out of the ground, miles away, at the head of the Zeta valley,—the one valley, and the only fertile part, of Montenegro. Passing the monastery of Ostrog, the modern village of Danilovgrad, and the old Turkish fortress of Spuž, the Zeta joins the other river, the Morača, at Dukle, where Mr. Munro, of Lincoln College, Oxford, spent some weeks last autumn conducting the excavation of the old Roman town of Dioclea, th supposed birthplace of the Emperor Diocletian. The Morača, rising in the mountains north of the Morača monastery, flows between stony banks along which no track leads. The two rivers, which below their junction bear the joint name of Zeta, cross the plain of Podgorica, and so reach the Lake of Scutari. One other river should, perhaps, be added to the list—a short stream which makes a mysterious appearance from a huge unexplored cavern at Rijeka, and, after a swampy course of three miles, is swallowed up in the lake. Montenegro exhibits the ordinary peculiarities of similar geological formations. Rivers suddenly rise, fully formed, from the rocks, and disappear as suddenly. It is the same in all the Karst district. This absence of water produces strange results. For drinking, the people use old rain water, which is generally stored in petroleum tins, invariably made in Russia, but as invariably bearing the English inscription, "Best refined petroleum;" or else they use snow. For myself, I have preferred the pangs of thirst to the pleasures of drinking in September the dirty melted snow of the preceding winter. There is a Montenegrin saying, that when God was creating the world, He carried the rocks in a sack. The sack broke over Montenegro, and all the stones in it fell on that unhappy land. Whatever may be the merits of this legend as an explanation, it is certainly a picturesque and accurate description of the geographical features of the country.

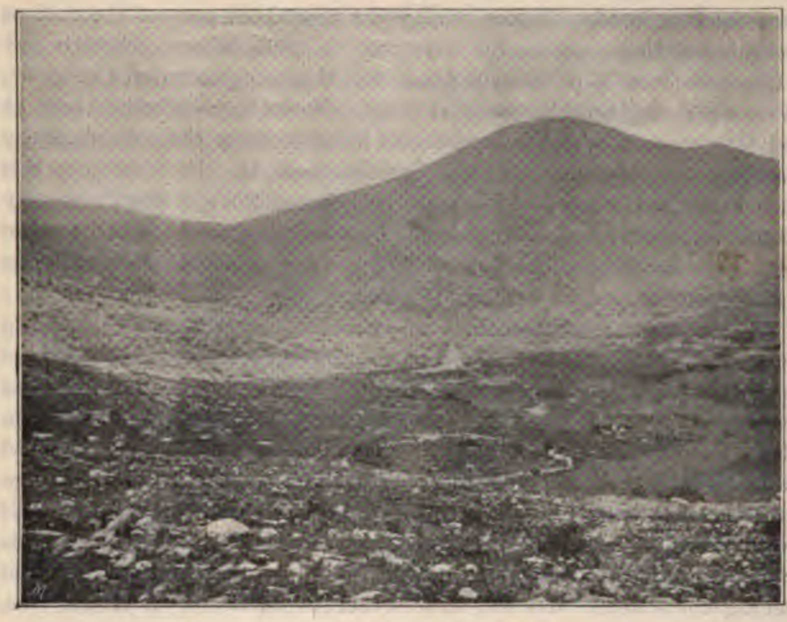

FIG. 1.—A MONTENEGRIN VILLAGE.

Beyond the limestone basin above the Cattaro zigzags, in which lies the village of Njeguš, there suddenly comes into sight over the dreary wastes of rock in the foreground a view of welcome beauty—range after range of the distant Albanian mountains never free from snow, and at their foot the broad expanse of the Lake of Scutari. The next large basin holds Cetinje, the capital. A collection of 200 small houses on each side of one long street, the village has few qualifications for a metropolis. It lies in one corner of the principality. It is not as large, nor as important commercially, as Podgorica or Nikšić. The only reason adduced for keeping it is, that to leave it for Europe is so easy. I use the word "Europe" deliberately; for, according to local usage, Montenegro is not in Europe, nor are the Montenegrins Europeans. When I reached the capital last July, the whole country was preparing to celebrate the four hundredth anniversary of the establishment of the earliest Slavonic printing press in the country. In 1493, before either Oxford or Cambridge had a permanent press, the Montenegrin ruler, Crnojević, set up a printing establishment at Obod. Books were printed there at that date, some of which I came across by accident in the old monastery church at Čajnica, just over the Bosnian frontier. In honour of this anniversary, universities and learned societies of Europe, the University of Oxford included, sent addresses of congratulation, while the Clarendon Press gave the Prince the appropriate present of a collection of books as specimens of modern English printing.

During these *fêtes* the centre of attraction was the square opening out of the main street of Cetinje. On one side is the modern palace of the Prince; on the other stands the old palace, the usual name for which—"the Billiard Saloon"—is a lasting evidence of the impression left on the minds of the people, when their late Prince Danilo imported a billiard-table and played on it in this building. Between these two palaces stands a large tree, beneath which the Prince displays himself every afternoon, and administers justice to his subjects. In this square, and in the streets as well, the populace were singing and dancing for a week. Of the dances there were three varieties. One, the "zetsko kolo," was danced by Albanians from Podgorica; fifteen of them, standing in an incomplete ring, slowly circled round, singing the words of a song in honour of Albanian prowess, composed by the Prince to satisfy his new subjects after the war. All these dancers were in full dress, the most remarkable part of which is a petticoat reaching to the knee, made of white linen, 60 yards in width. The weight of this costume—and I speak from personal experience—is very great; but the more yards in the garment, the greater dandy is the wearer. Another dance, the "cermničko kolo," consists of a ring of men or women with linked arms, who circle round, singing and jumping simultaneously into the air. Of this, the most complicated form, which I have only seen once, consists of two rings of men, one inside the other, with a third on the shoulders of the inside ring, who in the usual way sing and jump. In the third variety of dance, locally called the "oro," or eagle dance, two men or a man and a woman inside a ring of singers jump into the air, waving their arms and uttering shrill cries, supposed to resemble the eagle's shriek. The name of this dance is no doubt derived from the Greek word χόρος, which appears in the Roumanian "horo," and the shrieks of the dancers have been introduced to accommodate the dance to its supposed connection with the Montenegrin word for "eagle." To the disinterested spectator at a safe distance, the most effective variety of this dance is when it takes place on board a rickety boat, and the performers, in addition to the usual peculiarities of the dance, fire off revolvers and wave their yataghans or swords in the air as they jump. The opportunity the *fête* gave for observing the varieties of Montenegrin costume was unique. From Nikšić one afternoon came in 150 horsemen all wearing breastplates of silver and gold; while Podgorica and Dulcigno sent bands of the Mussulman Montenegrins all in their peculiar dress. The national costume, always worn, whether at home or in war, is particularly striking. It is made up of a red embroidered waistcoat under a long frock coat of pale green, white, red, or blue; loose baggy blue knickerbockers, with knee-boots or white stockings and hide shoes; and round the waist a belt of silk, which always holds a revolver, generally a yataghan, and sometimes an extra knife or pistol. On the head is worn the peculiar Montenegrin cap. This is small and circular, black on the sides as a sign of mourning for the overthrow of the old Servian kingdom at the battle of Kosovo 500 years ago; red on the top to signify the blood shed to avert that defeat; while in addition to the letters "N. I.," *i.e.* "Nicholas the First," the gold semicircle of a rising sun denotes the ultimate triumph of a new Servian power. The spectacle of the town crowded with brilliant costumes of all colours, worn by men of imposing height and magnificent carriage—the Montenegrins are probably the finest race physically in Europe—was exceedingly picturesque. Nor does the women's dress lack grace and charm, though, with its black and white hues, it is more sober, as befits the workers. In Montenegro it is the women who do the work. For the men, war is their chief occupation and their first thought. To this is due the fact that the rhapsodist of the Homeric type is still to be found among them. At evening in any Montenegrin village, the epic bard can be heard chanting songs—handed down from father to son — and accompanying himself with the "gusle," a one-stringed violin. The singer chants in tones our scale does not recognize, until every particle of breath is exhausted from his lungs. Then with a loud gasp he takes in more air, and without a pause continues his song. The bard is a privileged person. He is the only man who is allowed to beg from place to place—all other paupers are rigorously confined to their own village—while, if blind, he has the right of sitting on the palace steps to sing. It was remarkable, as showing the strength of the poetic feeling of the people, that the greatest enthusiasm during the *fêtes* was aroused by a blind bard, who sat on the palace steps and sang of the recent wars with the Turks. He was listened to by the crowded square in strained silence, only relieved now and then by rapturous bursts of applause. On the eve of the principal day of the *fête*, there was a magnificent illumination of Cetinje and its amphitheatre of hills, when every peak was brilliant with countless lamps of clay and petroleum.

For the following day the programme was a long one. After the presentation of the addresses to the Prince, there were two services, one a funeral service in memory of the founder of the printing press, and the other a service of thanksgiving. Inside the chapels of the palace and the monastery while these services were being conducted, the gorgeous colours of the ecclesiastical vestments, the brilliant uniforms of the foreign representatives, the state dress of the Prince and his family and of the Montenegrin officials, composed a picturesque and effective scene. A banquet in the open air, at which 2000 people sat down, and during which some thirty-two speeches were made and some horseraces, the first ever held in Montenegro, brought the day to a close. With the following day began an excursion into the interior to Podgorica, a large commercial town, half Turkish, just north of the Lake of Scutari. Everywhere along the road private houses and local communes had brought out of their best. Every village provided a banquet, speeches, and dances; and the most lonely roadside hut never failed to have a table in front of its door, spread with bread and meat, wine and raki, the national spirit, which any one was free to take. The largest banquet took place at Podgorica, where the tables were laid in the open fields. The following day was occupied by an excursion to the small island of Starčevo, in the Lake of Scutari. Here the programme consisted of a service in the tiny church, a banquet of fruit, and a dance by the Albanian-speaking women, bareheaded in the blazing sun. Cetinje was reached the same evening; and such was the end of the *fête*. Throughout the week nothing had been said that could give offence to any other nation. The semi-national, semi-literary character of the celebration was entirely kept up. Personally, I can only congratulate myself on the good fortune which made me a spectator of these *fêtes*. It enabled me to see a genuinely Montenegrin festival, observed with the national customs: and, more than that, by bringing me into contact with people from all parts of the principality, it immensely facilitated my subsequent journeys in a country where the people are naturally suspicious of the foreigner.

So far I have been dealing exclusively with the old Montenegro. For it is a convenient, though not an absolutely accurate, classification to divide that country into the new and the old. The two are entirely distinct. There is, however, one part of Montenegro which occupies an intermediate position between these two, and that is the plain of Podgorica, the Lake of Scutari, and the strip of land separating the Lake of Scutari from the sea. The Podgorica plain, which stretches from the junction of the rivers Morača and Zeta above Podgorica down to the Lake of Scutari, is the only part of Montenegro which lies at or near the sea-level. The soil here is fertile; but the possibilities of its cultivation are less than they might be, owing to the annual floods which swamp the low-lying lands on the borders of the lake. The water rises in the autumn, and throughout the winter covers the crops. The cause of these inundations is the incapacity of the river Bojana—the only outlet from the lake to the sea—to carry off all the water; for the rivers rise with great rapidity. In Albania, I have seen a dry river-bed, a quarter of a mile across, turned by an hour's storm into a raging and impassable torrent. The remedy for this evil is the rectification and deepening of the course of the Bojana, in order to regulate the outflow from the lake.

The Lake of Scutari itself, one half of which has been added to Montenegro by the Berlin treaty, resembles the Lake of Garda in size and in the beauty of its scenery. From Rijeka onwards the marshes are full of wading birds. Thousands of duck are found at the head of the lake; while all over it huge white pelicans lazily float.

Between the lake and the sea the country is mountainous, dry, and barren, with the exception of one small valley behind Vir Bazar. From this town a carriage road leads to Antivari, after crossing the Sutorman range of mountains, 5000 feet high. The old Venetian and Turkish city of Antivari stands two miles inland, looking down over the half-dozen houses of Pristan, which lie on the flat shore and form the tiny port. The carriage road goes no further than Antivari. To Dulcigno the path is even worse than usual, and, though at first large woods of old olive trees diversify the scenery, the general characteristics of the country remain the same. Beyond Dulcigno to the Bojana stretches a flat plain, the swamps of which have now been partially drained. Neither Antivari nor Dulcigno is at present of much value as a port. At Antivari there is no shelter; while the minute bay on which Dulcigno lies, is exposed to the full force of the Adriatic.

From the old Montenegro to the new the transition is in places dramatic in its suddenness. I have been on a mountain ridge, where on one side stretched the arid Montenegrin landscape, while on the other lay a new and fairer Montenegro, where the bare rocks yielded to grassy mountains, the treeless slopes gave place to dense primæval forests, and waterless tracts became fertile valleys, lavishly watered by mountain streams. So great is the change from the old to the new. It is in this new Montenegro that the loftiest mountains are. My ambitions had long been centred on the highest—Durmitor. But the mountain always seemed to bring discomfiture, and I almost fear that the spirit, which according to local tradition haunts every mountain-top in Montenegro, must have determined to baffle my endeavours to ascend it. My first attempt, two years previously, had been baulked by the prosaic obstacle of want of food. I had scoured Podgorica for a supply of tinned sardines, supposed to be caught and cured locally. But the most diligent investigations only discovered—and it was in a ropeseller's shop—one tin. It was an English biscuit tin, and empty. Without sardines Durmitor was inaccessible. Last year I made another attempt; but a week's bad weather dogged my footsteps, and though, drenched to the skin and almost frozen, I did succeed in dragging from Žabliak to the highest summit, called Čirova Pećina, four reluctant Montenegrins, who pleaded wind and rain as valid excuses for retreat, the driving mist hid anything more than three feet away. What I thus lost I can the more appreciate from the charm of the scenery and the beauty of the views of the Durmitor country, which I obtained when making my way to Nikšić from the junction of the Tara and the Piva rivers. Between these two rivers, which flow on each side of Durmitor in deep wood-lined gorges, the lofty grass lands stretch for miles unbroken, and the forty lakes give the district the name of Jezera, or the lake country. I reached the Piva, far from any human habitation, one evening after sunset. The thick forests, clothing the precipitous banks of the defile 2000 feet deep, through which the river flows, gave a sombre awe to the scene. In reply to shouts, there came across the stream, out of the darkness, three logs of wood, loosely bound together with twigs of willow. An aged ferryman propelled them. On this frail craft the horses were sent across one by one. When the turn of us human beings came, the weird solemnity of the scene and the accompaniments of the crossing made it difficult to imagine that we were not souls in the infernal regions, whom this Montenegrin Charon was ferrying in silence across the Styx.

Next to Durmitor in height, and connected with it by the range of mountains along which the old frontier ran, is Kom, at the eastern extremity of the country. Coming from Podgorica, on my way to Kom, and leaving the stony country which extends up to Zatrijebač, I ascended the peak Maglić, which gives the most beautiful view of any in Montenegro, including all the Albanian mountains to the south, and the double peak of Kom and the other Montenegrin ranges to the north. From Maglić the path leads northwards over a narrow saddle—an ideal watershed—thirty feet wide, separating the Velipolje valley, with its steep slopes, from the valley of the Tara to the west. From this point, as I looked over the forests far below me in the valley, I caught sight, for the first time, of the wooden buildings and trees and gardens of that mysterious town whose actual inaccessibility and rumoured fanaticism exercise so potent a fascination upon the Albanian traveller—Gusinje. Near here I received a visit from two emissaries from that town, sent to find out what I was doing, and to enjoin me not to go to Gusinje. There were good men and bad men there, they told me, but the bad men were stronger than the good; they thought, they added, that I was bringing money and documents to buy Gusinje and hand it over to Montenegro. Near here, too, an old Montenegrin, armed with a muzzle-loading silver musket, appealed to me to prevail on the Prince to allow the Montenegrins to attack Gusinje and take it for their own; they could do so with perfect ease, he said, if only the Prince would give permission. At one part of the route just here, the Montenegrins with me told me, every few hundred yards, blood-curdling stories—how behind that rock the Gusinjotes laid in wait last summer for one of their own chiefs, and shot him as he went; how on that spot had fallen, three months ago, another victim to the inexorable decrees of the blood-feud. It was here, too, that our tents were hurriedly withdrawn one evening from the top of a conspicuous hill on the Montenegrin side of the frontier, because they were supposed to present too attractive a mark for desultory rifle-practice from Gusinje. The proper method, it is said, of using a tent in Albania, is to pitch it and then sleep under a tree a hundred yards away. The tent, and not its owner, is bullet-riddled in the morning. At last I found myself on the southern slopes of Kom, at Carina, where, at a height of 6000 feet, a camp was pitched, among some Albanian-speaking Montenegrin

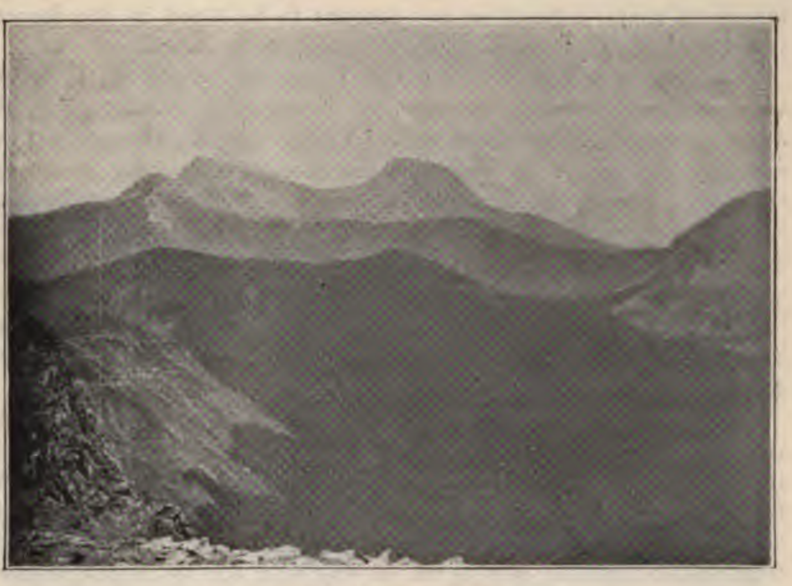

FIG. 2.—THE KOM RANGE, FROM MAGLIĆ.

(*From a photograph by Mr. J. A. R. Munro.*)

shepherds. From Carina the ascent to the highest summit, called Kučki-Kom, leads over the shale and rock slopes of the crater-like basin separating the two main peaks. Along the route were growing all the ordinary higher Alpine flowers, noticeably the dark-blue gentian and the yellow poppy; the edelweiss alone was nowhere visible. Though no stranger had ever ascended this mountain, the climb was not particularly difficult. One thing, however, did create a great sensation, and formed the topic of conversation among the natives for long afterwards. This was the use of a rope by Mr. Munro and myself to ascend the face of a limestone cliff by a convenient gully. The native mind could not understand it. The solitary Montenegrin, braver and more active than his comrades, who managed to reach the top by a circuitous route, refused on any account to be roped in the descent; if either of us fell, he said, we should pull him down too.

East and north of Kom are the Vasojevići people—in their own estimation, and certainly in mine, the flower of Montenegro. In this district, formerly independent both of Turkey and Montenegro, but now under Montenegrin rule, the houses and dress of the people are different from those elsewhere. The houses are not stone or thatched, but have high pointed roofs, the characteristic of all village houses throughout Bosnia. The usual Montenegrin dress is replaced by the tight-fitting white trousers, braided with black, of the Albanians over the frontier. The chief town of the Vasojevići is Andrijevica—twenty houses in a broad street—charmingly situated among wooded hills, where three rivers meet.

From Andrijevica I went to Berani, in Albania, visited the Roman remains at Budimlje, and some caves covered with early Christian symbols in the valley of the Lim, and the following day I proposed to cross the frontier by the Šiško lake to reach the Biogradsko lake, in Montenegro. The Governor of Berani came with us to a Turkish block house, not far from the frontier, and sent us on our way with a horse, a load of bread, and an escort of an officer and ten men. We parted with protestations of undying friendship, and as I rode away, he bestowed on me, as a token of regard, a diminutive cucumber. From the block house we went through Alpine pastures, over which were dotted low huts with bark roofs, and which the beech-glades made curiously like an English park. As it got dusk, we neared the Šiško lake. The Turkish soldiers, who were to escort us to the frontier, had no food or shelter; and as neither their officer nor the Montenegrin officer with me could see any serious international objection, it was arranged that the Turks should come to our tents, which were expected to be a few minutes across the frontier. Just after sunset we reached the shepherds' huts, 6000 feet above the sea, which form the village of Šiško. Here, to our dismay, we found from the inhabitants that the tents had been seen pitched close to the Biogradsko lake, five hours away. It was too dark and too late to go on. If we stayed where we were, what was to become of the Turkish soldiers, who were our guests? After some deliberation, it was settled to quarter them in the village, and to take the chance of a riot. So the biggest hut was prepared for ourselves and the Turkish officer, and the privates were distributed by twos among the other huts. It was a comforting reflection that none of these Turks could speak one word of Montenegrin; nor was sour milk—the only drink—likely to make them unduly excited. So the chances in favour of peace seemed strong. Unfortunately, the horse and bread had not arrived, and a Montenegrin, returning later in the evening, reported that they were two hours distant, on the Turkish side of the frontier. The Turkish officer wished to send his men to look for it. But instead of this somewhat risky project of despatching a band of Turks to scour, at the dead of night, the country of their hereditary foes, a squad of Montenegrins was sent off to look for the bread, and the Turkish officer and his bugler went on a hilltop near to try and rouse the nearest Turkish fort to send back the missing animal. Two attempts proved unsuccessful. No answering bugle notes were heard. Our bugle calls were drowned by the noise of the distant streams and by the slight breeze blowing in the wrong direction. Finally, however, the Montenegrins who had been despatched returned in triumph with the horse and its load, and all the inhabitants spent the rest of the night, crowded into our hut, in feeding

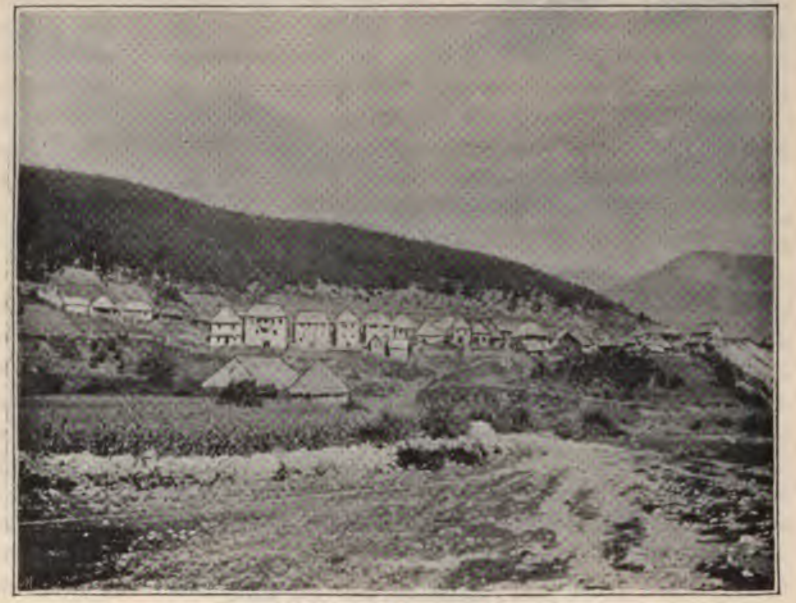

FIG. 3.—ANDRIJEVICA.

us with roast sheep and apples round the fire, and in singing songs. There was no disturbance during the night. The pleasure of shooting a handful of their foes had yielded to their hospitable Montenegrin instincts. The following morning, the Montenegrins escorted their guests back to the frontier, and refused to accept any payment for all the entertainment they had given them; while we continued our journey to the Biogradsko lake. It lies below the upland pastures of Šiško, and is surrounded by dense forests filled with chamois, deer, and bears—the prettiest spot in Montenegro. On each side the slopes are thickly covered with trees, except where, at their summits, stretch rich grass pastures; while the clear waters of the lake itself, filled with trout, reflect the woods that fringe its shores. The first picture of Montenegro — the stony basin above the zigzags — was drear and desolate, characteristic of the old Montenegro. Let me leave that country with the Biogradsko lake, the grass and woods of which are the type of the newer Montenegro.

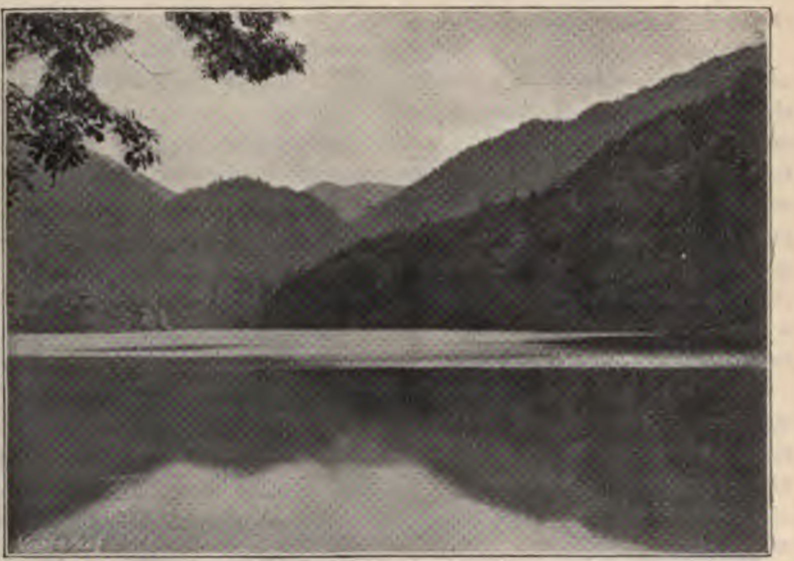

FIG. 4.—BIOGRADSKO LAKE.
(*From a photograph by Mr. J. A. R. Munro.*)

But before passing to Turkey, let me say a few words as to the people themselves. I should extremely regret if I failed to convey some of my own enthusiasm for the Montenegrin people. I cannot subscribe to the orthodox view that the name of the country—the "Black Mountain"—is derived from the "black hearts" of the people. Montenegro is not like that Armenian town, whose character is summed up in the saying, "Black walls, black dogs, black mountains, black hearts." And, if I may digress for a moment, let me say that, in my opinion, the colour of the mountains has as little to do with the name. I have seen the mountains from all sides and in all parts. They are not black, but white. It seems more probable that, as the name "Crnagora," "the Black Mountain," is unknown before the reign of Crnojević, the "Black Prince," four hundred years ago, the man gave his name to the mountain, and not the mountains to the men. The people themselves are not a race of savage barbarians. Every man, even the poorest, has the bearing and dignity of a gentleman. Education is universal and compulsory on all children over seven. Theft is unknown, drunkenness unheard of. Women are universally respected; a woman goes in safety where no man dares.

Their government may be paternal. A friend of mine told me one day he had just put five men into prison for some months. I asked him why. For saying, he replied, that they had seen after dark a figure dressed in white, sitting on a grave. Ghost stories, he told me, were bad for public morals. Their government may be despotic; but, though the Prince appoints all officials, it is always the best men who are found filling every grade of office throughout the country. In Montenegro, at any rate, a benevolent despotism has produced results a democracy often fails to realize. Nor ought it to be forgotten that in Montenegro they have long had a complete system of local government. Among this people, 300,000 all told, there are 500 village councils, elected every three years, ruled by popularly elected officials, levying rates, owning land, distributing charities, appointing supervisors of education (whose duty it is to deliver popular lectures on its advantages), and finding the solution of the problem of women's rights in allowing women to speak in the village meetings as long and as often as they may wish, but to vote not at all. The Montenegrin people are in a stage of transition. Pot-shots at Albanians now involve serious diplomatic consequences. They must abandon their Homeric condition, and renounce their epic ideas. The country has acquired ample resources; it is for its inhabitants to develop them. At present, however, they have not shaken off their old idea that every occupation, except fighting, is beneath the dignity of a man. Little has been done to open up their country. Corn is not produced in sufficient quantity to supply the inhabitants, and wine is drunk where it is made. The trade in dried fish and insect-powder—the chief exports—is small. In the timber and cattle lie the possibilities of development. The cattle trade engages the attention of the natives; the trees attract foreign speculators. Cattle are shipped to Malta, Austria, Italy, and France. For the timber nothing can be done, until the access to the forests is improved. It remains, then, for the people to adapt themselves to their altered conditions. On their ability so to do depends the future of Montenegro.

THE SANDJAK OF NOVI BAZAR.

From Montenegro I went to the Sandjak or district of Novi Bazar, which lies on the north-east frontier of Montenegro, dividing that principality from Servia, and extending from Mitrovica—the terminus of the railway from Salonica—north-west to the Bosnian frontier. Strictly speaking, the modern Sandjak of Novi Bazar is smaller than the old one, but it is convenient to use the term in its old sense as including all the country up to the Bosnian frontier. Politically, this district has a peculiar importance. The direct road to Salonica from the west passes through it; the Berlin treaty has revolutionized its constitution. By this treaty Austria was empowered to occupy Bosnia, Herzegovina, and the Sandjak of Novi Bazar; but, as the Austrian Government was not desirous of undertaking the administration of the Sandjak, it was agreed that the Ottoman administration should continue to exercise its functions there. Austria, however, reserved the right of keeping garrisons, and having military and commercial roads in the whole of the old Sandjak; and to this end the two governments arranged to come to an understanding as to the details. A convention was accordingly arrived at in 1879, by which it was agreed that the presence of Austrian troops in the Sandjak should not interfere with the functions of the Ottoman administrative authorities, which were to continue to be exercised, as in former times, under the exclusive and direct orders of the Sublime Porte. In accordance with these arrangements, the Austrian Government has posted its troops at three towns close to the Bosnian frontier, Priboj, Tašlidja, and Prijepolje. Across the river Lim it is understood the Austrians shall not go. There is, then, in the Sandjak a Turkish civil and military administration of all, and an Austrian military occupation of part. The interest of the Sandjak as a political experiment is increased by the absence of geographical information respecting it. Travellers here are few. It is difficult of access; it has no railways and no proper carriage roads.

Coming into the Sandjak from Berani, on the eastern Montenegrin frontier, the first town that I reached was Bijelopolje. My visit solved the mystery of the existence of an apparently important town, called Akova, which, on several maps published within the last ten years, appears some fifty miles to the north of Bijelopolje. Akova has in reality no separate existence. It is the Turkish form of the Servian name of the town, and it was only the imagination of the map-makers, which had evolved two towns from one. The Lim, the only river of any size in the Sandjak, flows past Bijelopolje, and the houses rise steeply from one bank of the river, while in the middle stands out a tall white campanile of a Christian church, which has now become the chief mosque. The arrival of the first hat-wearing strangers was not an event which the people could allow to pass unnoticed. Outside the town, where the troops were drawn up in line, they were assembled in crowds to gaze. Inside, as soon as the bridge was passed and the tortuous hilly lanes of the bazaar were reached, it was evident that the greater part of the inhabitants had turned out to witness the unusual sight. Every window was crowded with turbaned heads; fezes lined the streets; children stood on all the booths and stared in open-mouthed amazement. Speculators in seats to view the procession must have reaped a large harvest that day. As the people here are almost entirely Mussulman, and the town stands quite out of the world, Bijelopolje is at present perhaps the most fanatical place in the Sandjak. I had accordingly refused to enter the chief mosque, and had contented myself with inspecting the campanile from the outside, for I was anxious not to offend the susceptibilities of the people. There was no disturbance the night I stayed in town. A Christian, however, who left Bijelopolje the day after I did, brought word that the Mussulman population were much excited. In my looking at the outside of the mosque, they saw, he said, an attempt to upset their faith! They could not conceive what dark political motive I had in visiting their town, and, had I stayed there any longer, they would have risen against the European. Fortunately he had gone, before they converted their thoughts into deeds.

From Bijelopolje I made my way to Sijenica, the administrative centre of the Sandjak. It lies on an undulating tableland which extends northwards up to the Servian frontier, and eastwards and westwards for many miles. Not a tree is visible; there are scanty signs of cultivation; houses are few. It is a gigantic pasture land, not unlike the English downs. Hay is plentiful—three crops in the year; and the third crop—in cock—was, when I passed through, scattered over the plain. Each peasant, however poor he may be, has two or three horses and two or three cows. During the six months in the year for which the snow, at this height of 3500 feet, is thick on the ground, the stock require all the hay the land produces, and thus all export of the crop is prevented.

Four or five hours east of the straggling village of Sijenica the undulating grass country comes to an end, and the road to Novi Bazar follows a small stream, which flows between low-wooded hills, broadening out into a basin, in which the town of Novi Bazar lies. By some mistake our usual military escort had been dispensed with between Sijenica and Novi Bazar, and we had been accompanied only by some mounted zaptiehs, or constabulary. This led the Governor of Sijenica to despatch an urgent telegram to Novi Bazar to the effect that on no account was the return journey to be made without an escort of soldiers. There is no cavalry at Novi Bazar; but the ingenuity of the commander was equal to this emergency. A squadron was hastily improvised by turning pack-horses into chargers and mounting the infantry upon them. As the saddles were two pieces of board meeting at an acute angle over the horse's back, I did not envy the new-formed cavalry their ten hours' jog-trot back to Sijenica.

North-west of Sijenica the character of the country continues much the same. There are still the treeless, grassy downs and shallow depressions. Haycocks were still dotted over the pastures, and herds of sheep and cattle still visible on each side. Towards Nova Varoš the country changes its aspect. The forest region begins, and after passing through pine woods the town of Nova Varoš comes into view, picturesquely situated on each side of a steep valley not 200 yards broad. Nova Varoš, formerly the centre of a large cattle trade, has now been left stranded by the tide of commerce. The large orthodox church, built at the height of the town's prosperity fifty years ago, alone bears witness to the past. But the Christians are now too poor to provide it with bells, and a wooden plank, beaten with a hammer, is used instead. To-day the only industry is the manufacture of carpets and rugs. Every girl, on marriage, takes one or more rugs and a large painted chest to her husband. For this reason each house makes its own rugs, and each house uses what it makes.

From Nova Varoš to Prijepolje is a ride of three hours, part of the way through magnificent forests of fir and beech. At Prijepolje we again reached the Lim. Coming from the East, this town is the first place where the familiar Austrian uniform meets the eye, for here begins the curious anomaly of the double occupation of the country by Austrian and Turkish troops. To Tašlidja the road, along which run two distinct telegraph lines, one Turkish and the other Austrian, each with its separate poles, leads in six hours from Prijepolje. The town of Tašlidja, created by the refugees from Bosnia, lies on bare hill slopes, in which the Austrian soldiers have cut in white letters, twenty yards high, the initials of the Austrian emperor. Westwards a good carriage road leads to the Austrian frontier at Metalka. Here is stationed the most westerly outpost of the Ottoman power in Europe, and here is the boundary of the old Sandjak of Novi Bazar.

From Berani westwards the native populations are Slav. They all talk Serbian, or, as they call it, Bosnian. Bosnian, too, is the diplomatic language; for Turks and Austrians, in the absence of French, find their only means of communication in the Bosnian speech of their subjects. Commercially, the Sandjak is a road with no exit westwards. An impenetrable barrier of customs duties—the fruits of the Austrian occupation of Bosnia—stops all trade across the frontier. Tašlidja, two days' carriage drive from the Bosnian railway at Sarajevo, receives everything on pack-horses from Salonica, ten days' journey eastward. For the traveller the chief obstacle is that he is at once set down by the populace as an Austrian or a Russian. To their eyes there is no distinction of nationalities among foreigners.

Every stranger is an enemy, and has a secret political mission. Not long, for instance, after I had passed through Novi Bazar, an Italian friend of mine, coming from Albania to Mitrovica, wished to reach Novi Bazar. But he was not allowed to do so. Some consuls, he was told, had been there lately altering the frontiers, and the authorities at Novi Bazar had been obliged, in fear of the populace, to despatch them with a huge escort of cavalry, in the dead of night, over the Austrian frontier. Such was the version rumour gave of my own journey in the district.

Throughout the Sandjak I was under very great obligations to the Turkish officials. Their assistance rendered my journey possible; their great and unvarying kindness made it pleasant. The destiny of the Sandjak of Novi Bazar lies on the knees of the gods. One thing is certain: this key of the Balkan peninsula cannot retain its present form for long. The original Sandjak of Novi Bazar has seen many geographical changes; it will see more.

ALBANIA.

I deal last with North Albania. It is the least-known and most interesting part of the Balkan peninsula. The people speak a language alleged to be more ancient than Greek. There are strange rumours of classical remains hidden in the mountain recesses. There is every element of romance to fascinate the traveller. Albania is a country of mountains. Near the sea-coast—to the south and west of Scutari, for instance—there are plains; but in the interior there are range after range of mountains, unexplored and unclimbed. Parallel with the eastern Montenegrin frontier, and twenty miles or so away, lie the many branches of the Prokletija, that is, the "Accursed Mountains." From Montenegro I obtained magnificent views of this chain. They resemble very much the Dolomites in structure and shape, while at sunset the rocks assume the most marvellous shades of pink and green. Their bare peaks are destitute of any verdure, and show no signs of human life. Even in August the snow still lies in patches on their slopes, though at no point did I observe any trace of a glacier. In this chain lies, in all probability, the loftiest mountain in Albania. There is, however, a rumour of a mountain further to the south, which is higher than any other. The question whether this peak is the highest is likely, however, to remain undecided, as those best acquainted with the country say there is no chance of the mountain ever being approached, as the tribes on its slopes refuse all access to strangers. On the north of the Prokletija rises the river Lim, which, after passing by Gusinje and Plava, crosses Montenegro and the Sandjak of Novi Bazar on its way to the Danube.

In a country like Northern Albania, where not seventy-five per cent. of the people die a natural death, there is not much opportunity for commerce. In the plains near the sea-coast maize is grown, and Ipek has some reputation for its wine. The mountain tribes pasture their flocks and till the ground near their homes. In theory the land belongs to the Turkish Government, but, beyond a small payment on the beasts kept, they pay nothing in the way of taxes. There are few more warlike figures than the Albanian mountaineers. Their dress varies according to their tribe; but all invariably carry a rifle and wear a belt of cartridges, while the full-dress armoury consists, in addition, of two silver pistols and a curved sword, or yataghan, worn in the belt. The majority, whether Catholics or Mussulmans, shave their heads, except one lock of hair on the top, which they allow to grow long. Even in tending their sheep, or in sowing their fields, or in guiding their creaking tumbrils, drawn by bullocks and piled high with maize, no Albanian allows himself to be parted from his belt of cartridges.

I had long wanted to get to Gusinje, the large town already mentioned, situated in the middle of an amphitheatre of mountains belonging to the Prokletija group. Unfortunately, this particular part of the country was in a more than usually disturbed condition last year. The cause of this was a certain Mula Zeka, a person of whom it is difficult to obtain any definite information. I have talked to official Turks—civil and military—to Albanians and Montenegrins, and no two give the same account of this mysterious character. To some he was the Robin Hood of Albania. He did good to the poor; he had never harmed a single creature; he had even made roads where no roads were. To others he was the lowest type of a ruffianly brigand. One and all, however, agreed that Mula Zeka, an upstart plebeian of recent wealth and strong in the number of his family, that is, of his cousins and his uncles, could not brook the idea that he was not the equal or superior of a certain Bushara Bey, the head of an old aristocratic family, less prosperous now than once. Bushara Bey was on good terms with the Turkish authorities; Mula Zeka, consequently, was not. Last year the Government ordered Mula Zeka to appear at Ipek. This he declined to do; and when several governors and three battalions of soldiers were sent to Ipek to catch him, he went to Rugova. This place, probably the most inaccessible in the whole of Albania, is an isolated mountain; the only entrance is a narrow track in the rocks. It is inhabited by a tribe who have no communication with the outside world, nor allow the outside world to have communication with them. Having taken refuge here, Mula Zeka spent such leisure time as he had at his disposal, so I was told, in lying in wait for me with two hundred men, in the hope of diverting the attention of the Government from himself. I did not know this at the time, and therefore did not appreciate at its full worth the anxiety of the Turkish Governor of Berani, who knew how matters stood, when we had left Berani for a day or two and gone eastwards along the frontier. He sent a zaptieh after us to tell us not to go near Rugova. The zaptieh got drunk, and, when he returned without delivering his message, the infuriated governor told him that, if the Franks did not return by sunset, on his head would fall the penalty. That evening, all unconscious of our part in the drama, we rode into Berani just as the sun was sinking, and the zaptieh was saved.

As far as Djakova the country was in a state of great excitement, and divided into two factions—for or against Mula Zeka. Gusinje was strongly in his favour, and no man of any of the neighbouring tribes had dared to go there all last summer. The moment was therefore most unpropitious for my chances of effecting an entrance, and I was in the end unsuccessful. But as my efforts to visit the place are so typical of the conditions and methods of travel in this part of the world, I may briefly allude to them here. The accident of a couple of Montenegrins being killed near the Gusinje frontier, and a consequent commission to inquire into the matter, gave me the opportunity of getting a letter conveyed to the Governor of Gusinje, telling him that I proposed to come to that town. This unhappy individual—who spends most of his time confined to the barracks, for the Gusinjotes will not let him out—answered me a month later that he would consult his chief at Ipek. A Montenegrin doctor at Andrijevica, who had once been summoned by the Gusinjotes, under a safe conduct, to see a patient in the place, had promised to do what he could for me. But my chief hope lay in a Turkish official of an old family from Plava, who undertook to take me into Plava and back again uninjured, even though I had killed fifty men of that town with my own hand. The Montenegrins were strongly against the attempt, but finally the Governor of the Vasojevići gave me a "bessa" or "pledge of safe conduct" in Serbian to the leading man in Plava, whose acquaintance he had made politically. This curious document, which, as I did not use it, I afterwards opened and read, was as follows. Of my friend who was with me and myself the governor said, "They are travelling over the world for their pleasure. They are my personal friends. Wherefore I recommend them to thee as my friend, that thou mayest receive and attend upon them well, and that they may be in safety. For I have told them that thou art a good and honourable man, and that with thee, as with me, they are in safety. Wherefore I yield them unto thy charge and the sure protection of thy covenant." Once in Plava—where report said were ruins of the old Roman town—I should be able to get on the two hours further to Gusinje. Every arrangement had been made. But at the last moment my Turkish officer was sent away on duty. With him vanished all my hopes of getting into Gusinje.

The division of the country into tribes, and the universality of the blood-feud, are the great obstacles to a traveller in Albania. But though the blood-feud makes travelling difficult, yet without the blood-feud travelling would be impossible; for the system has some advantages. Treachery is unknown. The word of an Albanian may be implicitly trusted. If your deadliest enemy comes into your house, you must give him bread and salt; so long as he stays inside, he cannot be touched. All the details of the blood-feud are regulated by an unwritten code, called the law of Dukadjin, administered in each tribe by the chief and the old men. Of the provisions of this code, the following are instances: "If a man be killed while under the bessa, or pledge of safe conduct, of another, he who gave his bessa to the murdered man shall avenge his death." "If a man would be sure of his journey, it is enough that he be under a bessa, especially under the bessa of a chief or noble." Again, "If a man uses his arms against another and wounds him, but does not kill him, he shall pay a fine of £15 to the chiefs of his tribe. He who robs a traveller on the road shall pay £30 as a penalty; while he who steals beasts shall pay £5."

In connection with the blood-feud one of the most interesting and picturesque of recent events in Albania took place a few months ago, when there was a solemn reconciliation between the Albanians and Montenegrins at Vinicka, on the river Lim, near the Montenegrin frontier. The Montenegrins claimed 87 men killed and several wounded against the Albanians; the Albanians 104 dead and a smaller number wounded against Montenegro. The total of killed and wounded on each side exactly balanced. A battalion of Turkish soldiers and two battalions of Montenegrins met at the appointed spot. On the morning of the day the two armies were drawn up in lines facing each other, at right angles to and resting on the bank of the river Lim. The first part of the celebration was a religious service, in which both sides joined, conducted first by the Montenegrin popes, and then by the Mussulman hadji. Then the formal act of reconciliation began. The leaders of the Montenegrins and of the Albanians advanced, two by two, to the river's edge between the lines of soldiers, who presented arms. Each pair of men held one stone in their four hands, and each pair, on reaching the stream, flung the stone into the river, uttering, as it disappeared, the words, "As this stone is washed away and disappears, so let the blood-feuds between us be washed away and disappear." When the leaders of each side had successively performed this ceremony, the reconciliation was complete. By it the old scores were wiped out, and both sides could start afresh.

Such is the state of society in Albania. Its exploration is possible by conforming to the regulations of the blood-feud. Only thus will any stranger visit those unexplored regions of the Mirdita, of the Mat country or of the Dibra, and reduce the list of the geographical problems in Albania which still remain unsolved.

But now that I have described Montenegro, Novi Bazar, and

Albania, the question may well be asked, What interests have we in them? I acknowledge at once that our trade there is small, the possibilities of its development remote. But the Geographical Society, at any rate, is free from the curse of utilitarian notions. To make a country interesting and its knowledge desirable, it is enough that it should be unknown. But in this district the interest is more than purely theoretical. This meeting-place of East and West contains the key to the future political geography of the east of Europe. To know Montenegro, which, though tiny, has never yielded to the Ottoman power; to ascertain the political cohesion and the national sentiments of the peoples in the Sandjak of Novi Bazar; to discover the still unexplored resources of Albania, and the aspirations of its people, would do much to prevent any treatment of Eastern politics without reference to geography. For there are few parts of Europe where the changes in political geography have been greater, and the geographical knowledge of those who made the changes less. The vicissitudes of the Albano-Montenegrin frontier bear witness to this. The treaty of Berlin added to Montenegro the district of Gusinje, alien in feeling, in language, and in religion. Difficulties naturally arose. Ten years were taken up in settling them, and the frontier was at last drawn in accordance, not with the theories of politicians, but with the facts of geography. Geography asserted its ascendency; the Berlin treaty gave way. Gusinje was not handed over to Montenegro. Here, at any rate, the politician had not been what he should be—a geographer.

To remove this reproach from this part of the Balkan peninsula, we as Englishmen are particularly qualified. While we have not the obstacle of direct political interests, we have the advantage of the sympathetic friendship of the peoples, and I am convinced that, with time, knowledge, and tact, an Englishman can visit any of the yet unexplored districts of Montenegro and its Borderlands.

Before the reading of the paper, the Chairman, the Hon. GEORGE BRODRICK, said: I am sure we must all regret that our President is disabled by an attack of gout, happily not a very severe one, though enough to detain him at home, and I can assure you that, although I have taken the chair at his request, I feel very unworthy to occupy his place. Happily, my task is a very easy and congenial one: I have simply to introduce to you the gentleman who is going to address us presently, Mr. Cozens-Hardy, of New College, Oxford, who holds the geographical studentship of last year, which, as you know, is offered jointly by the Royal Geographical Society and the University of Oxford. Though geography does not hold quite the place I think it deserves in Oxford studies, I am not sure that it is generally known, at all events I have pleasure in mentioning, how large a number of our young tutors and undergraduates have travelled widely in their vacations and made good use of their opportunities. Of course, most of them have published nothing, but there are a few, like Mr. Tozer and Mr. Hogarth, who have done good work for geography, if not in discovering unknown countries, at all events in bringing the light of modern scholarship and science to bear on countries already known, but never before really explored. In this little group I think we may predict that Mr. Cozens-Hardy will hold a foremost place, and I am sure that I need not bespeak for him an attentive hearing for the address he is about to deliver to us.

After the reading of the paper, the following discussion took place:—

Colonel M. T. **Sale**: I have very little to add to the remarks made by the reader of the paper. One point which occurs to me as the most striking feature is the extraordinary difficulty which the whole country presents to a military occupation. It was always a puzzle to me, at any rate until I saw the country, how it was they managed for so many years to resist the Turkish forces; but after seeing the country wonder existed no longer. It was the most confused mass of serrated limestone rocks which it is possible to imagine, destitute of roads, and completely devoid of means of sustenance for an organized army. Now, however, a road has been made, and it is an open question whether that road may not prove disastrous to Montenegro in the future. Another point is the scenery of a part of the eastern frontier; I do not think the reader of the paper spoke of that, or of the Zem river on the eastern frontier. Looking from the country marked as Medun and Rikavac, one sees the most appalling precipice, while the Proklitija mountains are a most extraordinary group; I have seen nothing so striking in mountain scenery. Lake Scutari is another interesting point, for only in comparatively recent years has it been subject to flood. When I approached it in the height of the inundations, the whole of the bazaar and custom-house of Scutari were under water, and we had to approach through the streets on the far side to get at it. This is caused by the inflow of the Drin river draining a considerable valley subject to torrential floods, which have gradually raised the bed of the river by deposits, that headed back the waters of the Bojana river, so that the outlet of the lake is closed. On the coast the marshes are greatly prejudicial to the development of the country; but for beauty of scenery it is almost unequalled, the contour of the mountains being striking to a degree.

The Hon. T. W. **Legh**, M.P.: My knowledge of Montenegro and the adjacent countries is of a mere superficial character, and I am unable to add much to the stock of information of the scientific body I have the honour of addressing; but, superficial though my knowledge may be, it is sufficient to enable me to appreciate the journey so ably and yet so modestly described to-night. The journey is remarkable for several reasons. In the first place, it was more or less hazardous, because no part of Europe is more inaccessible in a certain sense, and more insecure as regards life and property, than Albania; it is no man's land, where every man considers every other man his natural enemy. Mr. Cozens-Hardy has shown remarkable diplomatic ability, because every one is looked upon with extreme suspicion by the Montenegrins, and he has achieved a most remarkable feat in that he has done what six great European Powers attempted in vain—ascertained and defined the correct frontier of Montenegro and Albania. He has truly remarked that Montenegro is inaccessible and rarely visited; for the ordinary tourists it presents few attractions, and yet considerable interest attaches to it. It is the one state in the Balkan Peninsula that has remained free ever since and during the whole period of the Turkish invasion, and from a political point of view it is the only place in Europe, so far as I am aware, where paternal despotism may be observed in full working order; where the hereditary sovereign is his own chancellor, prime minister, and commander-in-chief; in the morning administering justice under a tree, later reviewing his army, still later engaged on a commercial treaty with a foreign power. He is an able man; I cannot conceive of any one better fitted to play the part which he plays so successfully. He has added largely to the territory of his country, and that is a proof of the strength of his character. He in his own country preserves perfect order; robbery is unknown; your life and possessions are perfectly safe; you may go where you like. The Montenegrin shows little aptitude for anything except fighting.

Mr. J. A. R. MUNRO: I will add very few words to what has been said by Mr. Cozens-Hardy, who has pointed out how interesting a country Montenegro is, and what a fine race physically the people are. Possibly some here to-night may be induced some day to visit Montenegro; they will find plenty to interest them, and, if they keep their eyes open, may find historical remains. For instance, within a range of five miles it is possible to find a Roman town, an Illyrian fort, and several Christian churches of the sixth century. I bought near an old fort several coins of Scutari not to be found in the British Museum; no less than seventy inscriptions were found where we were digging. It would be difficult to find anywhere a Roman town just as it was left at the time of Justinian, as we found it. Dukle marks a stage in the Romanizing of Illyria. The cities of the coast derived their rights from the time of Augustus; Dukle and the central valley were enfranchised by the Flavian emperors; towns further inland had to wait until the time of Hadrian and the Antonines. Another point of interest that came up during the excavations was the strong hold Italian and Latin civilization had upon the province of Illyria. It was thoroughly Latin, and not Greek; and the organization and the forms of the churches, the architecture, and ornamentation point to the West, and not to the East. The history of Illyria from the seventh to the twelfth centuries is almost blank, and new light thrown upon it by inscriptions or anything else will be valuable. I hope any one making a visit to the country will look out for such things.

The CHAIRMAN: At this hour it ill becomes me to offer any remarks of my own, and I shall confine myself to expressing, as I may do on your behalf, your hearty thanks to Mr. Cozens-Hardy for the very interesting and instructive discourse we have heard this evening on a part of Europe that may be considered almost its darkest corner. I was a little afraid when Mr. Legh was speaking, as he did in so interesting a way, that we might transgress the bounds of geography and get into the region of politics; but in that respect Mr. Cozens-Hardy gave us a good example. He had a good word both for the Montenegrins and for the Turks, whom of late we have been used to hear denounced in no very measured terms. However, I think we shall agree that an address such as we have heard from Mr. Cozens-Hardy is of real geographical interest. As our maps get filled up, the progress of geography will probably depend more and more on careful and detailed studies of limited districts such as Mr. Cozens-Hardy has made, and I only hope that future explorers who represent us will be as thorough-going and conscientious as Mr. Cozens-Hardy has proved to be.

MR. COZENS-HARDY'S MAP.—This is a sketch-map based on P. A. Rovinsky's map of Montenegro, with additions, and corrections as regards the boundaries, by Mr. W. H. Cozens-Hardy. The hill work has been filled in from other sources.

CONTRIBUTIONS TO THE PHYSICAL GEOGRAPHY OF BRITISH EAST AFRICA.*

By J. W. GREGORY, D.Sc., F.G.S., of the British Museum (Nat. Hist.).

IX. The Plateau of Laikipia, and its Volcanoes.

The most important of the plateaux that border the rift-valley, both in area and from the evidence it is likely to afford as to the geological structure of the country, is that of Laikipia. This is a vast extent of undulating steppe varying from about approximately 6000 to 7000 feet in height, and occupying an oval area of about 5300 square miles.

It is bounded on the south by the forests of Ukikúyu; on the east by Kenya, the gneiss ranges of Doenyo lol Deika, and the Loroghi mountains. Its western limits are formed by Settima and the east wall of the rift-valley from east of Naivasha to Lersubugo east of Baringo, and the precipices of the lava-capped plateau of Morongóp; upon this side the foothills east of Njemps, Rangatan Busi, and Kinangop are also to be included within it. The northern end is the least known, but here it seems to taper off between the eastward curve of the rift-valley by the Sukut steppes, and the westward bend of the Loroghi mountains.

Laikipia has been very seldom visited. The indefatigable Arab and Suahili traders have found their way across it: thus Ferhagi of Pangani traversed it from Naivasha to Ndoro, and also from the former northward to Marabit.†

Only three European expeditions had previously set foot upon it, and these were all-powerful both in numbers and equipment. Thomson crossed it with the Society's expedition as far as the Guaso Nyiro in 1883, but he was there compelled to escape to Njemps under cover of night. Teleki and Höhnel traversed Laikipia in 1887, from south-east to north-west along the line of the main Suahili caravan route, along which they were guided by the famous Jumbo Kinameta; this was a little to the south of Thomson's line; Dr. Peters, with the German

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* Paper partly read at the Royal Geographical Society, January 15, 1894. Map, p. 384. Continued from the October number. A remark in the first part of this paper (*ante*, p. 290), to the effect that our knowledge of the African part of the rift-valley is mainly based on the study of specimens brought home by various travellers, may be taken to reflect unfavourably on Mr. Joseph Thomson's two geological maps. Nothing was further from my intentions. The paragraph in which the passage occurs, refers to the objects in my joining the expedition to which I was attached, and the remark was intended to apply to the area which that expedition hoped to explore, and which seemed to offer the greatest facilities for determining the age of the rift-valley. Full references to the works of others on the geology of East Africa, in which those of Mr. Thomson take a leading place, are given in a paper which I hope to submit shortly to the Geological Society. I did not, therefore, think it necessary to repeat them here.

† Denhardt, *Pet. Mitt.*, xxvii. p. 138.

Emin Pasha Relief Expedition, followed much the same course in December and January, 1888–89.

My own route lay to the south and west of any of these, as from the first we left the former routes well to the left. We thus passed the south end of Höhnel's "Marmanett Berge," and across the site of his "Angata Bus," to the valley between his Gojito Berg and the "Aberdare Kette." It was not till we were south of the latitude of Ndoro that we bent our steps more directly to the east.

Laikipia consists in the main of a vast lava plateau, the rocks of which are of some antiquity; though the basalt sheets at the north end of the plateau are younger than the trachytes and andesites that cover the largest proportion of the surface. The whole plateau belongs to an area of internal drainage, as the Nyiro and its numerous tributaries, the G. Narok, Laschau, Nairotia, Ngare Songoroi, Guaso Rangatan Nado, are finally lost in the Lorian swamp (see p. 28), while the rivers of the western foothills enter the lakes of the rift-valley.

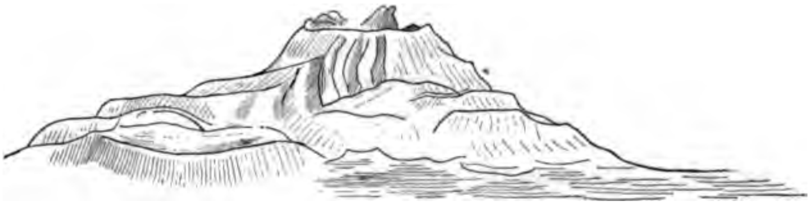

Fig. 4.—Longonot looking west from the summit of the Col to the E.

Laikipia may be divided into four main districts—the western foothills, the northern lava plain, the Ndoro basin, and the Settima plateau, which may be considered in this order.

At the point where most travellers descend into the rift-valley, the Kikuyu fault-scarp is almost an unbroken cliff of 800 feet in height; at about 300 feet above the floor there is a narrow terrace, but this disappears both to the south and north. On the other side of the Longonót pass, the platform reappears and soon becomes of considerable width. Thus at Naivasha the Kikúyu fault-scarp is replaced by two. The first forms a long low cliff of lava facing the west, with a vertical face usually about 40 feet in height. Above this is the great grazing land known as Kinangop. I, therefore, for this cliff adopt the appropriate name of the Kinangop fault-scarp, which was given to it by Mr. E. Gedge, though he of course called it an "escarpment." On the east side of Kinangop is the more imposing fault-scarp which forms the western limit of Laikipia, and is part of the great "Laikipia fault-scarp."

The Kinangop plateau extends to the north across the valley of the

Malewa (Murentat), and along that of the Gilgil or Naitolea to the great grazing plain known as Rangatan Busi.* Here the two fault-scarps reunite, and there is but one main scarp from Kekupe and the mountains east of Elmetaita to the north end of Lake Losuguta (Hannington). At this point, however, there appears a complex series of foothills and step plateaux between the low scarps east of Njemps and the great vertical cliff-face of Doenyo Nelesha.

Further, again, to the north beyond Baringo another line of elevation traverses the rift-valley, and has the effect of uniting the various fault-scarps into the west face of the basalt-capped plateau of Morongop.

As the foothills east of Njemps are topographically somewhat complex, and geologically of great interest, it may be advisable to examine them more in detail.

A short distance to the east-south-east of Njemps Ndogo is the first outlier from the foothills, which here consists of a ridge running from north-north-east to south-south-west. It is split into three by some faults of which the scarps face the west, while a grass-covered slope leads down to a bay alluvium which runs from the Njemps plain southward into the hills. To the south the ridge rises and broadens so that it joins the main series of foothills. The name of this thrice-faulted ridge is Lolbobo, and the bay of alluvium which it forms is known as Summuran. The high hill to the south end of the bay which connects Lolbobo and the main series is known as Doenyo Ngusagari, and the stream which flows down the bay bears the same name.

The main foothills in this district may be called after Larabwal; this is a plain at the foot of the steep fault-scarps of Nalesha and Doenyo lol Mwari, and bounded on the west by a series of ridges and rounded summits. The entrance to the district from the plain of Njemps lies at first along the gorge of a river, which was dry when we entered it. This is followed to the east-south-east for about a quarter of a mile, until it bends sharply to the south just before its course is broken by some falls. A stiff climb up the north wall of the gorge over some nodular altered andesites leads to a dry valley rising to the north-north-east. The route then bends round the north foot of the hill which forms the east side of the valley, and then to the south and south-south-east till it reaches the opening of the Larabwal pass. A very steep sinuous game track leads over a series of lava crags to the summit at the height of 4430 feet. From the summit and during the ascent we obtained fine views of Baringo and the opposite hills of Kamasia. After crossing a second col the pass opens out to the Gopo (or "district") Larabwal. This is a fair level plain 10 miles long and 5 broad. It is somewhat oval in shape, tapering at either end to a gorge that at the upper end is the channel of the Guaso el Narua; at the north end of Larabwal is a swamp, from which a river flows through a gorge toward Baringo. This may be Thomson's Guaso "Teen," which in its lower course he calls the Guaso Boli.

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* The correct spelling of this name is very doubtful. Thomson (*op. cit.*, p. 209, and Index, p. 361) calls it Angata Bus, which he appears to interpret as "Treeless Plain." Mr. Ravenstein calls it Angata Bush, or "Ash-grey Plain." Denhardt calls it Rangatan Wus, and says the latter word means "a cloud," a very probable explanation (*Pet. Mitt.*, Bd. xxvii. p. 138). I always, however, heard it called Rangatan Busi, or "the place of goats;" this must be compared with Rangatan Ndari on the other side of Settima, which means "place of sheep." If this is the true etymology, then the name is due to the Suahili traders, though it is now adopted by the local natives. *Daren* and *gera* are the Masai respectively for "goats" and "sheep."

The west side is formed of a steep scarp, which is divided by the gorge which Teleki descended. The part to the north is called the Doenyo Neleshá, and that to the south the Doenyo lol Mwari. On the west side there are a series of hills somewhat irregularly distributed, and forming a striking contrast to the straight cliff on the opposite side. Larabwal is not quite level, as some fault-ridges occur upon its floor and divide it into two; the western half is known as Njoro (or Lanjoro, *i.e.* "spring") Larabwal, and the eastern is that of the Guaso el Narua.

The northern lava plateau has not yet been visited by Europeans, though it has been crossed by Ferhagi of Pangani. Höhnel saw it during his return from his excursion to the Guaso Nyiro;* he describes it as an undulating, steppe-like plateau, with a number of steep but flat-topped hummocks. I had occasional views of it from the Marmanett Berge, while I was able to obtain a better idea of its geological structure from its western outliers, such as Morongop, north-east of Baringo. It is limited to the north by the western bend of the gneiss ridges of the Loroghi mountains and the eastern bend of the rift-valley.

The Ndoro Basin may also be summarily dismissed. It is a level plain of an approximate mean altitude of 6300 feet. It is bounded on the north by the great northern lava plain forming the left bank of the valley of the Guaso Narok; on the west and south-west it ends at the foot of the mountains of Settima and Sabugu la Poron (the Marmanett Berge of Von Höhnel). Its limits on the east are Kenya, Doenyo lol Deika, and the district of Gadormurtu. The country consists in the main of level grassy steppes, with occasional conical volcanic hummocks and lava crags. It is traversed by numerous rivers, of which the chief are Nyuri or Nyiro, Laschau, Nairotia, and Narok, which all unite and flow eastward into Lorian swamp. Numerous papyrus swamps occur along some of these. The name Ndoro is used by the Masai for the highest southern end of this area, and is sometimes restricted to some kraals at the west foot of Kenya; these had been abandoned a short time before my visit. This is the highest part of the basin, and forms the watershed between the Nyuri and the Tana.

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* 'Zur Rudolf-See,' p. 463.

The Settima Plateau is a higher district than the Ndoro basin, and its mean altitude is approximately 6700 feet. It occurs round the eastern foot of the great volcanic pile of Settima, and separates this from the Ndoro division of Laikipia. It occupies the site marked on Von Höhnel's map as the Aberdare Kette, the southern end of which he calls Settima Kette. It is, however, certainly not to be regarded as a mountain chain, as it consists of an undulating plateau intersected by numerous rivers, which cross it at right angles to the supposed mountain axis. The only peak-like elevations upon it are an irregularly distributed series of small volcanic bosses.

The rivers that I crossed during my traverse of the district are the following, going from north-west to south-east:—

1. The Guaso Narok, or "Black river." This is said to rise in a swamp called Kope Kope, and in its upper course it is named by Thomson and Von Köhnel the Guaso Ururi; the former writer gives it a prolonged extension to the south. Von Höhnel, however, correctly cuts it short. I crossed it near its head, but it was only known to my guide and some neighbouring Wanderobbo as the G. Narok. The name Ururi is probably a result of confusion with the Nyuri. The river where I crossed it varies from 10 to 30 feet in width, and from 1 to 2 feet in depth; this ford was at the altitude of 6450 feet. I could get no information about the "Thomson Falls," and, judging from Mr. Thomson's description of them, they must be considerably lower down the river.

2. Guaso Laschau. This was represented by two branches, which we crossed at the altitudes of 6740 and 6710 feet. They flowed through narrow valleys in the lava plateau. The name was first reported by Höhnel; it must be the same river as that which Thomson calls the Kadede.

3. Ngare Songoroi (Höhnel), or N. Pes (Thomson). This rises in a swamp at the altitude of 6610 feet. We crossed this at its western end, and there found some small black specimens of *Telphusa*, which Prof. Jeffrey Bell has determined as an Egyptian species (*T. berardi*, *M. Ed.*).

4. The two branches of the Guaso Rangatan Ndare must unite with the last-mentioned stream before the ford where Teleki and Höhnel crossed it, as they do not appear in the latter's map.

5. Guaso Nairotia. Höhnel indicates four streams uniting to form this river. On the Settima plateau it consists of two branches, each about 18 inches deep and 40 feet wide. They both flow through deep channels; that of the northern branch has formed in places a regular cañon.

6. Guaso Rangatan Nado. This also consists of two small streams, which we crossed at the altitude of 6780 feet near the Guaso Nairotia.

7. Guaso Nyuri. Of this six branches were crossed, the names of which are the Guaso Narol Gwinia, the Ngare Kurésh, the Guaso Nyiro (two branches), the Ngare Moitian, and the Guaso Barakari. Where

Höhnel and Thomson crossed it they are reduced to three. This river receives the drainage of the northern slope of the Kikuyu uplands.

The Hummocks on and at the base of the Settima Plateau.—Scattered over this section of Laikipia is a considerable number of small bosses of lava (basalts and andesites). They are generally low, ranging from less than 100 to 200 or 300 feet in height. A few occur at the base of the plateau on the level steppes of the Ndoro basin, and these may be included topographically, as they must be geologically, with the others. These hummocks are most numerous near the upper Guaso Nairotia. The following are the names of the principal members of this series: Doenyo Mesia, Lubule, Gethuri, Lasho, and Narol Gwinia.

KENYA.—On the east side of the Leikipia plateau rises the greatest, and once, if not still, the highest of African mountains. It owes the name by which it is known in Europe to a mistake of its discoverer, who applied to it the word which his Wakamba guides must have meant for the whole of the upland country from which the mountain rises. The only name which Mr. J. Ainsworth, the Superintendent of the British East Africa Company's station at Machakos, has been able to obtain from the northern Wakamba is Njálo, which they also use for Kilima Njáro; Njáro is probably only the Kikamba, and Njáro the Kisuahili form of the same word. The mountain, moreover, is not in Ukambáni, but in Ukikúyu, and the Kikúyu name for it is Kilinyága; this ought, therefore, to be adopted according to the strict rules of geographical nomenclature, but, as Kenya is now so well known in Europe, an exception may well be made in its favour. The ordinary spelling is, however, very incorrect, as, according to it, the name should be pronounced Ke-nī-a.

Among other synonyms are Meru, which is used by the Zanzibaris; Doenyo Ebor, or "White Mountain" (not "Black Mountain," as the translator of Von Höhnel's 'Discovery of Lakes Rudolf and Stephanie' says in a footnote in vol. i. p. 364); or Doenyo Egeri, or "Spotted Mountain," as it is called by the Masai.

Kenya covers a considerably larger area than Kilima Njáro, but the latter is better known, owing to its proximity to the coast, and, in fact, it is occasionally seen from the sea. Kenya is also much older than Kibo, the higher of the two peaks of Kilima Njáro, and corresponds to the same period in the volcanic history of the country as the old eroded cone of Mawenzi.

Kenya was first seen by a European in December, 1843, when Krapf saw it from Kutui in Ukambáni.* It has been subsequently seen by Europeans on the way to Uganda, and by Thomson and Peters, who passed near its west foot on their march across Laikipia. It had twice been previously visited by exploring expeditions, but the only European who had ascended above the forest zone was Count Teleki, in 1889, as the members of the British East Africa Company's expedition had to turn back at the height of 8700 feet.*

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* Krapf, J. Lewis, 'Travels, Researches . . . in Eastern Africa,' 1860, p. 442.

The mountain may be conveniently divided into three parts: (1) the forest zone, with a long and very gentle gradient, covered by dense jungle and forest; (2) the zone of Alpine pasturages in which the slopes are steeper, rock exposures and crags numerous, and which is cut up by deep valleys into a complex series of ridges; and (3) the central core.

The *forest zone* is characterized by its gentle gradient, and by the denseness of its forest and jungle, in which the most striking feature is the thick belt of huge bamboos. On the west side this zone extends down to the Leikipia plateau, into which it passes somewhat abruptly at the height of about 7300 feet. As this is the line of the east and west watershed across Laikipia separating the basins of the Tana and the Guaso Nyiro, the forest zone does not descend so low as on other parts of the mountain. From the steppes at Ndoro the forests can be seen to descend both to north and south; as the eastern face of the mountain rises from a lower level, it is probable that they are also lower on this side.

The ascent through the forests is very trying. The trailing plants that cross from the summits of the lofty junipers and *Podocarpus*, and the branching of the bamboos, combine to form a canopy that makes it below dark and damp. At every blow of the mattocks with which we cut our way through the jungle, the sodden bamboos poured shower-baths upon us, while our feet and legs were kept wet and cold by the dense undergrowth of shrubs, ferns, and *Selaginella*, and the swamps and pools through which we had to wade. The three days' work in this zone told heavily upon the men. Owing to the cold and the mist we could not start before eight o'clock, and every hour we had to light fires to warm the porters, as they would otherwise have been too cold and numbed to proceed. On the morning of the fourth day we emerged, to our intense relief, into the sunshine of the high Alpine pasturages.

The *Alpine zone* is fairly well defined below at the level of 10,200 feet; but its upper boundary is less definite, as in damp sheltered valleys the pasturages run a good distance above the normal height of 15,000 feet. The slopes here are much steeper than in the forests. Rock exposures are numerous in the form of crags and pillars of agglomerate upon the ridges, and as bosses on the face of iceworn slopes. Ordinary trees are absent except for a few on the edge of the forests, and the only ones present are a new arborescent groundsel allied to the extraordinary *Senecio Johnstoni*, and some woody giant lobelias (*Lobelia Telekii* and *Lobelia gregoriana*); these, however, are abundant, and supply sufficient firewood. This part of the mountain is cut up by numerous deep valleys, the walls of which give abundant evidence of former glacial action. The Alpine zone may be divided into two subzones, which are well characterized by the difference in the flora (see *post*, p. 68); the lower one consists mainly of a sharp wall of rock some 700 feet in height, which, from the plains below, I had mistaken for the walls of a crater, but which really is the slope of the icefall of the great sheet glacier that once covered the mountain. The upper subzone is that of the deep valleys, the ridges between which are often the beginning of the crests that pass up into the arêtes of the final peak. It is in these valleys that the arborescent *Senecio keniense* is abundant, in some places forming regular groves. Here also lives a small rodent, which my colleague, Mr. Oldfield Thomas, has identified as *Otomys irroratus*, while I picked up a skull of *Hyrax*, and noticed the footprints of elephants, probably about two months old.

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* Gedge, Ernest, "A Recent Exploration under Capt. F. G. Dundas, R.N., up the River Tana to Mount Kenia," *Proceedings* R.G.S., new ser. vol. xiv. 1892, pp. 527–528.

According to Count Teleki, the walls of the original crater are still preserved. Lieut. von Höhnel, on his authority, tells us* that the crater is from 4 to 4½ kilometres in diameter, that it is circular, and from 200 to 300 metres deep, and finally that it is full of snow and ice. If such were the case, the outer slope of the crater ought to be in this upper Alpine zone. The ridges between the valleys are formed in the main of volcanic ejectamenta, such as ash and agglomerates with numerous intrusive dykes. It is obvious, therefore, that this is the site of the old crater wall, but it is now so eroded that no trace of the actual rim remains.

The Central Core.—The final peak of Kenya consists of five or more steep pyramids which rise from the snow-fields and glaciers at their base. Teleki states (von Höhnel, *op. cit.*) that the peak is one of the projections on the wall of the crater, but its geological structure forbids this hypothesis. It is really, as Mr. Joseph Thomson † recognized by a distant view, the central core of a very denuded old volcano.

The five pyramids that may be seen on the south and west sides are as follows: (1) and (2) the double central peak; (3) a sharp peak on the western arête, the height of which is about 17,500 feet, and which I propose to name Point Piggott, after the Acting Administrator of the Imperial British East Africa Company; (4) and (5), on the south side, are two aiguille-like peaks, separating the Lewis and the Tyndall glaciers, above which they tower with bare cliffs of excessive steepness.

As is usual with the cores of old volcanoes, the whole of the central peak is extremely rugged and difficult, and presents on all sides a forbidding array of bare precipices and slopes, which are usually at too high an angle for much snow to rest upon them.

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* Von Höhnel, 'Orographisch-hydrographische Skizze des Forschungsgezietes der Graf S. Teleki-schen Expedition,' 1887, 1888. *Denk. Akad. Wiss. Wien.*, Bd. lviii. (1891), 1892, p. 457.

† Thomson, Joseph, 'Through Masailand,' edit. 1887, p. 224.

In attempting a brief sketch of the main features of the mountain, it may be convenient to treat the subject under the following divisions: (1) the ridges; (2) the valleys and rivers; (3) the lakes; (4) the glaciers; and (5) the former extension of the glaciers.

The Ridges have in the main a radial direction from the central core, but especially in the upper Alpine zone their arrangement is somewhat complex.

In the first place, to take those of the central peak, I only saw four of the main arêtes sufficiently closely to be able to say anything about them. One of the largest runs off to the east-south-east, and is continued as the north wall of the Hobley valley. It rises fairly steeply from the curve of the valley at the east end, and then runs for a couple of miles with only a slight rise, but with many rough crags and aiguilles upon its crest; then, bending more to the east, it passes abruptly into the eastern arête. The southern arête is at first sight the most promising from a mountaineering point of view, for though there are numerous cliffs along it, there seems more hope of turning these. It crosses the upper end of the névé field of the Lewis glacier, and a series of hot plates rising through it, show that the ridge is not there very deeply buried; the steep eastern face is here corniced. South of the glacier there is a small col 16,600 feet in height, beyond which a branch of the crest runs off to the south-east as the south wall of the Hobley valley, while the main ridge rises to the south to the twin Lewis peaks. At the southern of these it divides, and a branch runs to the north-west to the north Teleki peak. This latter is one of two peaks on the crest which I have named the Teleki ridge, as it overhangs the end of a valley, which, for reasons subsequently stated, I propose to name after this explorer.

The next main arête is the south-western, and it is really double. It is excessively steep and broken, while the snow-fields on either side cross it at intervals. This arête sinks below the most northern of the three main glaciers; the double ridge that forms the north wall of the upper part of the Teleki valley may represent its western continuation.

The west arête is not so steep as the last; it is broken by the great Point Piggott, and a series of vertical cliffs.

The ridges that traverse the upper Alpine zone in this part of the mountain often appear to be quite independent of the higher arêtes. A considerable number radiate from Mount Höhnel, the principal secondary peak not belonging to the central group. One goes to the east to join the Teleki ridge; another to the north-east forms the west wall of the cirque in which nestles the upper tarn of the Teleki valley; one to the west-north-west with the "Phonolite crags" is the south wall of the Teleki valley, another to the west-south-west forms the south wall of the Höhnel valley; and a fifth goes to the south, but, after sending off several branches to the south and south-east, bends round to the south-west as the left wall of the upper valley of the Guaso Mairi.

To the north of the Teleki valley there are four main ridges, all of which trend to the west-north-west; the southernmost of the four is forked at its upper end, and encloses a snow-filled hollow. From the eastern extremity of this ridge a short one branches to the north-north-west; this compels the stream that runs from the northern of the two tarns upon the col below Point Piggott to make a long détour to the north, before it is able to enter one of the west-north-west valleys. The valley through which it then flows I am glad to name after Mr. Joseph Thomson, whose keenness and topographical insight I have often had occasion to admire.

The Valleys.—The two main valleys in the south and west sides of Kenya are those which strike from the foot of the central peak to the south-east and south-west respectively. The former is the broader and longer, and stretches from the base of the peak at the angle between the east and south arêtes in a great bow curve to the south-east. As this is probably the valley that would have been struck by the Kenya expedition of the British East Africa Company, I propose to name it the Hobley valley after the geologist and cartographer with that party. It is bounded to the north and east by the east arête, and by a long crag and aiguille-covered ridge that continues this to the south-east. The other side consists of the south arête, which faces the east with a cliff of great height, which is in places fringed by an ice cornice formed of snow swept up by the wind from the glacier on the west slope of the arête. To the south of the col above the Lewis glacier the crest divides into two ridges, one of which bends to the east and includes a peak of about 15,600 feet in height before it is lost to view as it curves round behind the sky-line of the left side of the valley. The west side of the Hobley valley is so steep that very little snow rests upon it; the stream in the valley receives its main supply from the more gradual eastern slope, the upper part of which bears a good deal of snow.

The principal valley on the west side of Kenya is that by which Count Teleki ascended, and in which he reached his highest point. I therefore propose to name it the Teleki valley, and to apply the same name to the ridge at its head and the lakes upon its floor. The valley receives the drainage of the three main glaciers. It is the largest of the streams, and is entitled to be regarded as the head stream of the Guaso el Nairobi, and therefore as the actual source of the Tana. The main course of the valley runs east and west; but it curves gently northward at its lower end, while it is bent sharply in the same direction by the Teleki ridge at the upper end. A branch from the south-east here joins it, and in this is the larger Upper Teleki tarn. This arm of the valley drains the hollow between Mount Höhnel and the Teleki ridge. The gradient in the branch of the valley that here comes from the north is much steeper, and the stream falls as a noisy torrent over the crags that formed an icefall in the glacier that once flowed down the valley. Above the old icefall the valley forks again, one branch continuing northward to the two northern glaciers, and the other bending eastward to the snout of the Lewis glacier.

South of the Teleki valley is a parallel valley, which, with the mountain and lake at its head, I beg to name after Lieut. Ludwig von Höhnel, Count Teleki's able colleague, whose maps are among the finest in the literature of East African geography. The valley begins as a cirque cut in the layers of lava and ash of Mount Höhnel. It descends rapidly as a deep narrow valley through the agglomerates and volcanic ejectamenta of this part of the mountain. It emerges at the foot of the great icefall cliffs, and subsequently no doubt joins the Guaso el Nairobi in the upper forest zone. The most interesting side valley from this is that which joins it from the north, just opposite the agglomerate crags, under the shelter of which one of my camps was pitched. From the character of the rock at its head, I have called this the Phonolite Cwm.

South of the Höhnel valley there is another, which rises due south of Mount Höhnel, and, soon bending to the west, receives a branch produced by the forking of the ridge that starts from the south end of Mount Höhnel, to form the south side of the Höhnel valley. This side valley is occupied by an extensive swamp, the waters from which join the main stream, and they together give rise to the Guaso Mairi.

North of the Teleki valley, there are at least three other valleys. The first commences at the col with the two tarns, and flows west-north-west, ultimately bending more to the northward, till it emerges at the foot of the icefall. The stream which discharges through it apparently bends south, and joins the Guaso Nairobi. The next valley, which I have named after Mr. Joseph Thomson, is important, as I believe it does not belong to the Tana watershed. It descends at first to the north-north-west for about half a mile, and then turns west-north-west. This stream probably flows north into the Guaso Nyiro.

The Lakes.—Count Teleki has recorded the existence of one lake on Kenya, but I was prepared to find a considerable number when I saw how extensively the mountain had been glaciated. They occur in hollows and rock basins in the agglomerates and ashes, and are, doubtless, mainly fed by springs in their beds. They act as reservoirs, and from them rise many of the streams that drain the west and south slope of the mountain. The largest lake is that which I propose to name after Lieut. von Höhnel. It is situated in a fine cirque in the cliffs of Mount Höhnel. The lake is about 600 yards long and 400 wide, the greater length being north and south, and is situated at an altitude of 13,980 feet. It is fairly oval in shape, but the east side is irregular, owing to the ingrowth of alluvium. It is no doubt glacial in origin, as it is in a rock basin, which is deepest at its upper end, and is supported on the west by a rock barrier, which is extensively *moutonnée*, and bears numerous large erratics. It receives the drainage of five feeble brooks, and discharges its surplus waters by a stream which issues from its north end, and flows by the Höhnel valley into the Guaso Nairobi.

In the Teleki valley to the north of this, there are two more lakelets, the lower of which was that seen by Count Teleki; it is a small tarn on the floor of the valley above the uppermost of the three moraines that project halfway across it. The upper and larger of the two Teleki tarns occurs in a branch from this valley at the north foot of Mount Höhnel and below the steep talus-strewn slopes of the Teleki ridge. The latter tarn is circular, and the former somewhat pear-shaped. Both have outlets to the stream which flows down the valley from the glaciers.

Two more tarns occur on the summit of the col that leads from the upper Teleki to the Thomson valley. They occupy rock basins, and one drains to each of the two valleys mentioned. They are not connected, as a *moutonnée* ridge bearing erratics occurs between them. Both lakelets are irregular in shape, and the three glaciated bosses of rock rise above the surface of the northern tarn.

The Hobley valley has also two small lakes which lie in the main course of the stream. I have pleasure in naming them the Bird-Thompson tarns, after the caravan leader and interpreter in the British East Africa Company's expedition.

The Glaciers.—It has long been known that the summit of Kenya was covered with a certain amount of snow, but owing to the steepness of the peak this seemed to be very limited in amount, for the descriptions of those travellers who had seen the mountain in the distance showed that the Masai name of Doenyo Egére ("the Spotted Mountain") was very appropriate. There appeared to be nothing on the mountain comparable to the great cap of snow and ice that covers the summit and fills up the crater of Kibo, the highest peak of Kilima Njaro; Count Teleki, moreover, described the snow as occurring only in the crater.

One of the main objects of my visit to the mountain was to determine whether there were any true glaciers with moraines and crevasses upon the mountain, and especially if there were any evidence of their former greater extension.

The glaciers which I saw are all grouped on the south-west side of the central core. There are three principal glaciers of the ordinary type; for the largest of these I propose the name of the Lewis glacier as a slight tribute of respect to the memory of the late Professor Carvell Lewis, whose untimely death stopped a work that has had a considerable, and which seems destined to have an even greater, influence upon the study of former glaciations. The glacier rises from a névé field which occupies the area between the base of the larger pyramid and the edge of the south arête, and fills up some hollows near the summit of the crest.

The névé field has a fairly gentle slope down to a small icefall, where the glacier is very much broken up by a series of snow-covered crevasses, through the gaps of which there appears the exquisite crevasse blue. Below this, the glacier narrows and ends off with a rotten snout at the height of 15,500 feet.

On the right bank, the glacier flows close below the base of the vertical cliffs of the two aiguilles; its left bank is formed in the main by a line of loose lateral moraine. The snout is surrounded by a set of several terminal moraines, the last of which has been broken through by the readvance of the glacier. The surface is remarkably free from *débris*, but the height and composition of the left lateral moraine shows that this has not always been the case.

To the north of the Lewis glacier occurs another, the base only of which did I succeed in visiting. This glacier is smaller than the other, but much steeper. It occurs in the hollow between the two aiguilles and the south-west arête. The bulk of its material is apparently derived from falls from the corrie and hanging glaciers upon the face of the peak, and from a large couloir that runs up to the south arête. I propose for this the name of the Tyndal glacier, after the man to whom is due most of our knowledge of glacial physics.

The third main glacier drains a névé field to the north of the south-west arête, and extending thence along the base of the west arête and the south face of Point Piggott. It extends down to the level of 15,300 feet. Its lower right bank is formed by a lateral moraine; the level of the ice on the left side is raised by falls of ice from the two corrie glaciers which cling to the cliffs above. I propose to name these the Heim and the Forel glaciers after the two Swiss geologists who have added so much to our knowledge of the structure and variations of the Alpine glaciers. The Heim glacier is the larger, and is to the south of the other; its lower end consists of a vertical face of ice about 300 feet in height. Ice avalanches from this fall on to the glacier beneath with a crash that echoes and re-echoes along the valley. I propose to name this the Darwin glacier, as a reminder that for the first precise description of a glacial valley in England we are indebted to the late Charles Darwin.

At present the south-western glaciers of Kenya do not descend below the level of 15,300 feet, while the snow-line, if I may be allowed to use this objectionable expression, may be taken at about 16,000 feet. This, however, is even more variable on Kenya than usual, as under a vertical sun it is fully exposed to intense heat, and as the gradients in the central core are excessively steep.

The Former Glaciation.—One of the main objects of my visit to Kenya was to determine whether at any former period the glaciation had been more extensive than at present. That this has been the case there is abundant evidence to prove. How far the glaciation extended, it may be impossible to determine, for the lower limits are now hidden by the jungle of the forest zone.

Immediately we emerged from the forests, we came upon a moraine, which belongs to a line of terminal moraines which runs all round the mountain at the base of the cliffs of the old ice fall, and forms the lower part of the pasturages of the Alpine zone. Some distance, however, below this, in the forest zone, there are some huge ice-worn erratics, and the shape of the ground thereabouts suggests that this is a further set of moraines, and not a mere marginal fringe.

In the higher parts of the Alpine zone the evidence of the former glaciation is remarkably distinct, and perched blocks, striæ, *roches moutonnées*, ice-worn lake basins, and numerous moraines demonstrate the former extension of the glaciation. The evidence will be subsequently given elsewhere.[*] It has, however, been advisable to refer to it here, owing to the bearing of the subject on the former distribution of the high Alpine flora, which is considered in Section XI. of the present paper.

SETTIMA.—On the west side of the plateau of Laikipia rises another great volcanic mass, the nature of which has, I think, been misunderstood by those who have previously seen it. It was first discovered by Mr. Joseph Thomson in 1883, from the rim of the crater of Longonọ̈t; he saw it frequently during the march up the Naivasha-Baringo valley, and passed round its northern edge on his way to the plateau of Laikipia. He therefore marked it in his map as a mountain range, more than 60 miles in length, and proposed to call it the Aberdare mountains.[†] He represents it as formed of three main peaks; that to the north he called Settima, that on the south, Doenyo Kinangop, and that in the centre, Subugu la Poron. To the west of these he placed a fourth peak or spur, Doenyo Goyito, separated from the main chain by a valley and river, which he marks as the head stream of the Guaso Narok, under the name of the river Ururi.

Höhnel, who visited the mountains five years later, extended Thomson's idea, though he used the names very differently. He cut short Thomson's Ururi, and seems to have entertained serious doubts as to the run of fifteen miles to which he reduced it, as he only dots its course. He, however, very clearly expresses the view of the double mountain chain, showing to the east a long line of hills to which he gives no altitudes, and the whole of which he calls the "Aberdare Kette," or Settima Kette. To the west of these he places two mountains which he calls "Gojito Berg" and "Kinangop Berg;" he estimates their height at 4000 metres. These are separated from the Settima

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[*] See "The Glacial Geology of Mount Kenya," *Quart. Jour. Geol. Soc*, vol i. part 4. November, 1894.

[†] Thomson, 'Masailand,' edit. 1887, p. 207.

Kette by a deep but dry valley; through the pass between the two mountains, Gojito and Kinangop, Mr. Ravenstein marks the course of Ferhayi of Pangani's route from Naivasha to Ndoro.

I was led to visit these mountains in the expectation that if their topographical structure were as described in the maps of Höhnel and Thomson, the centre would be found to consist of a nucleus of gneiss, forming what is known to geologists by Suess's term "horst." I therefore struck due south from a camp on the upper Guaso Narok toward the main mass of the mountain, until I clearly saw that a continuation of this course would bring me round on to the grazing land of Kinangop overhanging Naivasha.

As I had no desire to renew my acquaintance with the Masai of this district, and having gone sufficiently far to show that there was no mountain range left unnoticed to my west, and that the mountain to the south was the same that I had seen from the rift-valley, the route was bent slightly to the east. It was now clear that the great mass to the south of me was Thomson's Aberdare chain, and Höhnel's Kinangop and Gojito Berge, and I therefore began the search for the Aberdare chain or Settima Kette of the latter author.

The structure of the country is so different to that which I had anticipated, that it was some time before I could determine my position on the maps. To the south and west was a huge volcanic pile with a very gradual slope, leading up to extremely jagged rocks at the summit. These doubtless represent the central core of an extinct volcano. There was, probably, a double centre of eruption, but the pass between the two is but slightly lower than the main peak, and is not used. Ferhayi of Pangani's route lay across the plain of Rangatan Ndari ("the place" or "grazing plain of sheep,") which is really to the north of the Guaso Nairotia, instead of to the south as represented on our maps; hence it passes round the base of the north slope of the mountain and over the grassy steppes of the Rangatan Busi to the valley of the Murentat, and along this to the Naivasha valley. A party of Wanderobbo, whom I met in the woods here, were very emphatic that there is no other river between the G. Nairotia and the Murentat.

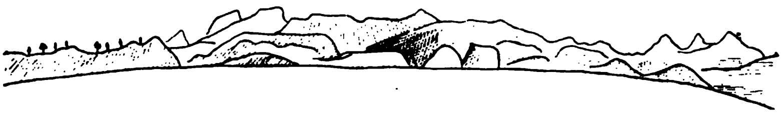
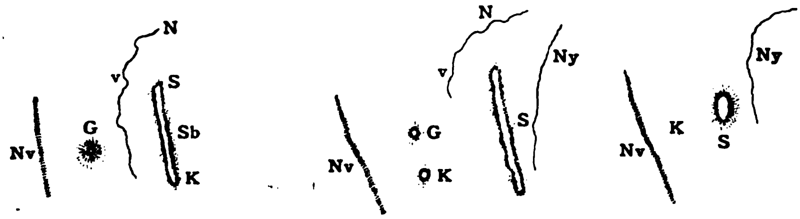


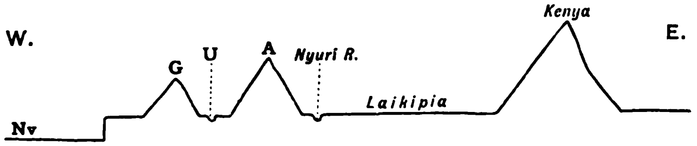
Fig. 5.—Settima from the East: seen from the steppes N. of the Guaso Nairotia and N. of Cp. 73.

I was able to get the name of the volcanic pile from Masai, Wakáuvi, Wandérobbo, and Wakikúyu, and they all agreed that it was Settima. The Wakikuyu have two names for the two centres of eruption, and call the southern one Kisúri. I could get no recognition of the name D. Goyito, but it may be in use among some of the Masai in the rift-valley, as my opportunities of talking with them were but limited. All four tribes insisted that Kinangop was never used for a mountain. "It is a Gopo or Rangatan," * they exclaimed, "and not a Doenyo."

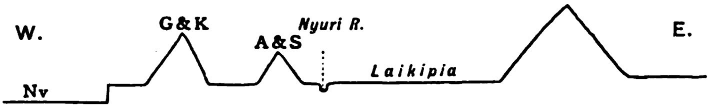
I therefore gradually recognized that Höhnel's Gojito and Kinangop are part of the same volcanic mass, and that this is the true Settima. It followed, therefore, that Thomson's Ururi † is the same as the Guaso Nyiro, and not the upper continuation of the G. Narok. In regard to the names of his four mountains, Kinangop is certainly the pasture land between the western foot of Settima and the rock wall which runs along the meridional rift, a little to the east of Naivasha. Of Subugo la Poron I could get less definite information. Subugo means a forest-covered hill, and it would be appropriate to any part of the eastern or



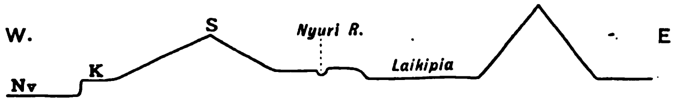
Thomson. Von Höhnel. Gregory.



Thomson.



Von Höhnel.



Gregory.

Fig. 6.

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* Gopo, a level district; Rangatan, a grazing plain.

† Uless Ururi is merely a waterfall, which is the meaning of the word.

northern slope; but it is almost certainly the name of the wooded hills to the north of the route from Laikipia to Rangatan Busi, which Höhnel has called the Marmanett Berge. Ferhagi reported it[*] as being nine hours north of Settima, which is the right position, if this view be correct. Doenyo Gojito may be only a west spur, unless, as seems most probable, it was based only on an end view of Settima itself. Höhnel certainly marks no mountains west of the main mass.

The next point to be considered is, what place is to be given to Höhnel's Aberdare Kette and Settima Kette, which he places twelve miles to the east of Thomson's Aberdare range. All that occurs there is a flat grass-covered plateau, 6700 feet above the level of the central plain of Leikipia. The plateau is intersected by a series of deep ravines, which have in places a cañon structure, and it bears upon its surface a number of basalt hummocks, which are either the denuded remnants of a lava sheet, or, as is more probable, a number of small volcanic cones. They are very irregular in arrangement, and most of them are separated from Settima by the upper waters of the G. Laschau and the G. Nairotia. The cones are very small and unimportant, and have none of the characteristics of a mountain range. The plateau on which they occur is that division of Laikipia which I have called the Settima plateau (p. 20).

It is clear, therefore, that the name Aberdare mountains must be used either as a synonym for Settima, or else abandoned. As the name has originated in a mistaken view as to the structure of the country, and has been applied by Von Höhnel in a totally different sense to that in which Thomson used it, and as neither Settima itself nor the basalt knolls on the Settima plateau can be spoken of as a mountain range, the latter course seems advisable.

The adoption of the name Settima for the volcanic mass, which is piled up near the western edge of the Laikipia plateau, moreover, helps one to realize its correspondence to Kenya on the eastern side of the same district.

(*To be continued.*)

THE ANGLO-GERMAN BOUNDARY IN EAST EQUATORIAL AFRICA. PROCEEDINGS OF THE BRITISH COMMISSION, 1892.

By Consul C. S. SMITH.

A JOURNEY to Kilimanjaro and back gives little opportunity for the relation of novelties. The mountain and its inhabitants, animate and inanimate, have been well described,[†] and from a geographical point of view little remained except to accurately map the district. The construction of an accurate map was one of the chief aims of the Commission, and as regards the bolder features I trust that it has been attained. As regards the minor features, it must be understood that time did not allow us to closely examine every part, and that, therefore, much that has been mapped depends on a distant view. Which parts are likely to have been clearly seen may be deduced from the following account of our doings.

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[*] Denhardt, *loc. cit.*, p. 138.

[†] A full bibliography of this subject is given in Dr. Meyer's 'Across East African Glaciers.'

During February and March, 1892, at first without skilled assistance, and later with the help of Mr. Imam Sharif, Khan Bahadur, of the Indian Survey, I examined the mouth of the Umba river. Jungle and mangrove swamp combined to make this work difficult and unpleasant. In July, after the rains, I made a fresh beginning. This time I was accompanied by Lieut. G. E. Smith, R.E., as well as by Mr. Imam Sharif. The good services of these two stand on official record, but I am glad of this opportunity to mention them publicly. It may be of interest to record the duties of each member of the expedition. The observations, astronomical and terrestrial, were, generally speaking, taken and worked out by myself. I also computed the triangulation, and prescribed for the sick. I supervised the making a small collection of plants for Kew, and of course conducted the communications with Dr. Peters, my German colleague. Lieut. G. E. Smith, besides assisting with the observations, took at every station panoramic [*] outlines, upon which were inserted the true azimuths and vertical angles as soon as ascertained. These sketches were most valuable. He also kept the accounts of the expedition. Mr. Imam Sharif [†] undertook, as a rule, the plane tabling, a duty which he carried out very efficiently, and, besides, sometimes assisted with the observations. We were escorted by twenty Zanzibar soldiers, who, with their officer, had been lent by H.H. the Sultan of Zanzibar. Our caravan varied in number from about ninety to a hundred and twenty porters. Of these, only the head men were armed. The porters, who were young men enlisted at haphazard in Zanzibar, gave a little trouble at first. But East Coast natives are easily disciplined if rightly managed, and when they once understood my ways, there was little ground for complaint. Their cheerfulness and ready obedience under hard fare and hard work is admirable. After five months we came back in our full numbers with the exception of one porter, who died when on detached service, and of two porters whom we left sick in good hands at Taveta.

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[*] The book of panoramas, together with the other work-books used by the expedition are with me; the field sections from which the maps were prepared, are at the Intelligence Department.

[†] During the interval Mr. Imam Sharif had performed the valuable service of surveying upon a large scale the town of Zanzibar, and this in spite of its being the rainy season. He has subsequently accompanied Mr. Bent to Arabia.

On beginning work in July, our first care was to astronomically measure the length of the base, Jombo-Kilulu. This done, we passed up the Umba valley for about 40 miles, and then made for Mlalo in the Usambara mountains. The river Umba for the last 15 miles of its course flows in a channel about 60 feet wide, cut deeply into the alluvial soil. Any rainfall in the basin of the Umba makes the lower part of the river overflow all its neighbourhood, a circumstance which the natives well know how to use. They retain the flood water on their fields by means of dams made of earth and weeds. We saw sugar-canes of an unusual size, also good crops of rice and tobacco.

The town of Vanga is the principal place in the Umba district. It is a walled town, with, perhaps, 600 houses. The town is on a creek, which can only be entered near high water even by dhows or boats. It stands on a bank, and is thus raised a few inches above the surrounding ground, which is mostly covered with mangroves, and flooded at spring-tides or in time of rain. The principal commodity exported from the town appears to be wooden rafters, of which any quantity may be cut in the mangrove swamps. The Imperial British East Africa Company is represented in this district by Mr. T. T. Gilkison, a gentleman of whose ready assistance whilst I was in his neighbourhood I would make grateful mention.

Concerning the Digo people, who inhabit the Umba district, I have little to add to the account published in vol. ii. of the Supplementary Papers. Two of their villages, Chole and Kobe, which I visited in 1885, have been destroyed in wars between two sections of the tribe, and certain villages near Jombo have been lately destroyed by a punitive expedition sent by the Imperial British East Africa Company. The Digo villages, except those close to Vanga, are, generally speaking, built in spaces cleared in the thick jungle with but one approach, which is through a narrow path provided with strong low doors, only to be passed in a stooping attitude. The dangers to be guarded against are attacks from neighbours and from raiding Masai, who still occasionally come to the coast to try and steal goats. The Wadigo have now no cattle. All have been taken by pestilence or forays. The village furthest from the coast is Chuini. There was formerly a village near Mwa Kijembe, where Mbaruk-bin-Rashid established himself when at war with Seyyid Barghash. It was, however, abandoned, and now nothing can be seen of the settlement.

The country near the Umba is capable of receiving a population twenty times as numerous as at present; and I do not doubt that it would soon fill up if order were assured. It is difficult, however, to see how that can be unless the power of the Masai is thoroughly broken. The coast jungle belt extends about as far inland as Mwa Kijembe. The district beyond, although believed to be capable of rich yields, looks at present forbidding enough. The country is overgrown with mimosa and euphorbia in such manner as to make progress very slow, even with pioneers always in front of the caravan. Close by the river there are always fine tall trees and pleasant camping-places. Game is now rare. Zebra and hartebeest and a few small gazelles are all that can be seen, and even these in small numbers. We never saw even the marks of a buffalo. All herbivorous creatures seem to have suffered very heavily from the late cattle disease. The rhinoceros is occasionally encountered, and there are a few elephants, but these are very rare. We saw no live elephants, but we found a dead one near Perani. As regards birds, guinea-fowl and partridges may occasionally be shot.

From the Umba river we went to Mlola, and then up to Mlalo in the Usambara mountains. This departure from our direct route was necessary in order to enable us to shake off attacks of fever, the result of our exposure to malign influences in the hot plain. To reach Mlalo we had to climb the Usambara hills by a steep path, which the weakness of fever made to seem interminable. Arrived at the top, it is seen that the mountain-system is formed of a large elevated area with hill-tops rising from it. Mlalo is a fenced town situated on a small hillock at the upper mouth of the valley down which flows the Umba, making in one place a leap of about 70 feet. Near Mlalo is a Lutheran mission station, under a German pastor, with a gardener as his only companion. They have built themselves a pleasantly situated station, and have opened a school for children. They have no natives actually settled with them, and, as may be expected, the attendance of the children who are unused to school is very fitful. The parts near Mlalo are populous and very fertile. They are well watered with little streams, and the people understand how to irrigate by conducting the water to their fields in artificial channels. Living in the mountains, the people feel safe from marauding Masai, and can build their beehive huts where convenient without needing the protection of a fenced town. The climate is delightful for a European coming up from the hot plains. In the morning the temperature used to go down to 52°, and remained moderate during the whole day * (in September). Sheep, which give excellent mutton, were to be obtained; bananas and sugar-cane and other kinds of native food were plentiful.

After our visit to Mlalo we descended once more into the plain. At the foot of the hills we found several villages, some inhabited by Kamba people, a half pastoral tribe who possess great numbers of goats. All these lower villages are fenced for protection against the war-parties of Masai, which constantly pass near to them. The names of the villages on the west side of Katulifetha are Mnasi, Mbaramu, Mlalo pa Mdimu, and Ponde. The headman of Ponde is a vassal of Mwasi, the

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* Mean temperature of Mlalo, 65° Fahr.; of July, 59·7°; of November, 67·8°; extremes 50° and 79°.

chief of Gonja, who himself is a son of Semboja, a Swahili of Persian descent, who left Pangani many years ago and built a town at Masinde, on the west side of the Usambara hills.

Having made a trigonometrical station at Katulifetha we went to Gonja under the Pare mountains.

Between Ponde and Gonja is a plain about 20 miles across, which, when we passed over it in September and in November, was an arid waste, with the usual growth of thorn trees and high grass. During the rains it becomes a swamp, but it is always passable. The water on it drains partly into the Mkomasi, and perhaps into the Mbaramu. Much sinks into the ground.

Gonja is one of several fenced towns which stand not far from one another. The Pare mountains, at the foot of which it is built, seem to contain a number of villages where bananas and sugar-cane and food of all kinds is grown. But the British Commission had no time to explore them. Just above Gonja is the Thornton fall, where a river flows in broad streams over the face of a precipice about 300 feet high. The precipice is of black, smooth rock. The stream is about 100 feet wide as it falls. Seen from just opposite the fall, from a grassy slope covered with large pink balsams, the water as it descends looks like sheets of silver. It is impossible to express in words the beauty of the shapes assumed by the free masses of water as they shoot down the face of the rock into the round pool at the bottom. The base of the fall is about 1050 feet* above the level of the camp, and the river runs down past it. After leaving the fall, it runs in a rocky bed; and for about a mile of its course it goes underground, so that no water can be perceived.

The next important place at which we stopped is Kiziwani, where the Germans have constructed a strong palisade on the banks of a small tributary to the Kiziwani river. During the rainy season the Kiziwani river flows into the northern part of the plain between Gonja and Ponde, and its water is eventually drained off as explained above. At other times, however, it all flows into the earth; a fact which presented itself to our notice in a striking way. On our return journey we reached Kiziwani during a few days' rain. The river was so swollen that we could not cross it, and I looked forward to a long delay or having to bridge the river. The next morning, however, the river had subsided; it was quite low, and we crossed without difficulty. We crossed the river-bed again about a mile lower down, and to our surprise found that no water had come there. The bed was covered with dry leaves. All the flood water off the hills had flowed underground in the intervening space.

From Kiziwani we went to Lake Jipe by way of Gurungani and Baya camp. Water was obtained at both places. "Gurungani" signifies "at the water-hole." The holes are in a stream bed in the solid rock; they have presumably been worn * by the friction of boulders constantly rolled round by the action of the current. They contain water long after the bed is dry, and are filled by the smallest shower of rain. The water could be drunk, but was far too dirty to wash in.

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* This was measured by aneroid, the height of the fall by clinometer.

During a short halt near Kwa Seguiro we encountered some of the inhabitants. They are of the Pare tribe. The men are armed with bows and arrows. Their hair was in little ringlets richly pomatumed with red clay, or perhaps it would be better said that the men attach masses of red clay to their heads by means of their hair. Each little bunch of hair and clay looks like a bead of dull red coral. The women wear kilts of tanned goat-skin, ornamented with patterns worked in white beads. They wear immense brass bangles with punctured patterns about their necks, and great coils of iron wire round the fore arm. They carry strings of beads round the upper arm, and bands of cloth worked with beads round the knees; also bracelets and armlets of very fine copper and iron chain. It is probable that they carry most of their portable property upon their bodies.

From Kwa Seguiro the ground falls gently towards the Jipe lake. Near the lake the slope is so slight that the adjacent land to the south of it no doubt is flooded and swampy in time of rain. The land on the east side of the lake has a slight rise, and the water would probably drain off it quickly, thus making it convenient for living on. The neighbourhood of the lake is the only place where we saw much game in the whole journey. We saw some very large troops of zebra and antelope, chiefly hartebeest, Grant's gazelle, koodoo, also small gazelles with zebra. The numbers have, however, been greatly reduced by the cattle plague, and are not to be compared with what is described by Messrs. Thomson, Johnston, and Meyer. We saw no buffalo, nor the marks of any. A few years ago this animal was very common, especially near the Jipe lake. We only once in the whole journey saw the marks of giraffe. Rhinoceros and ostriches were rarely seen; the marks of elephant we occasionally saw. We found great difficulty even in shooting our food, because the game had been made very shy by several people shooting in the neighbourhood just before our arrival. In Lake Jipe itself are crocodiles and hippopotamus. There are also fish and numbers of birds.

I need not describe the beautiful but unhealthy forest in which the Taveta people have their villages, for this has often been done by more competent persons. I will go on to deal with our proceedings in the neighbourhood, only taking this opportunity to acknowledge our indebtedness to the local knowledge and kind help of Mr. W. Hamilton, a servant of the Imperial British East Africa Company, who, unhappily, has since lost his life at Kismayu.

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* This process is fully explained in Dr. Meyer's book.

From Taveta our first expedition was to the crater lake of Chala or Nakurta. We camped on the top of the crater ridge, about half a mile from the highest point. When we had been shown the place where descent could be made to the water, we found no difficulty in scrambling down. On the days we were there the lake showed no effervescence, nor did any currents tend to draw the paddle out of the hand. Lieutenant G. E. Smith went afloat in a pontoon we found there. He sounded, and at a short distance from the south-west end of the lake obtained 28 and 35 fathoms. I imagine that this mysterious lake, which always seems to be about the same level, is fed subterraneously by streams from Kilimanjaro.* A stream which suddenly springs into existence just to the east of the crater, and flows into the Lumi, is no doubt supplied from the lake and prevents its rising above a certain level.

From Chala we went into the Rombo country. We were first hospitably received by a chief named Ngogo, and then by another named Mkinabo. Each village lies hidden in banana groves; that of Ngogo is protected by hedges, but Mkinabo's village is a walled stronghold. A short description of the latter may be of interest, for, I believe, there are many such in the Rombo country. The chiefs' houses are built in an enclosure, of which the rough stone walls are about 11 feet high, and much thicker at the bottom than at the top. The place is entered through a long passage, which is formed by the wall being doubled. The space between the double walls is about 18 inches wide at the bottom, forming a narrow path, but the sloping shape of the walls makes their tops 10 or 12 feet apart. The entrance to the passage is closed by a wall across it, with an aperture about 3 feet high at the lower part, making it necessary to stoop very low in order to enter. At intervals in the passage, which is about 200 yards long, there are walls built across with the same low entrance, so that an attacking party must enter at a great disadvantage. The Rombo country appeared to be in parts very fertile. Bananas are the principal product, but all the East African products, with the exception of cocoanuts, are grown. The fields are kept exceedingly clean, all the stones being collected in little heaps. The cultivated parts are near to villages, and towards the plain they are bounded by a curiously definite line, along which a path runs.

When we left Mkinabo's village, it was our intention to proceed into Useri, skirting the territory named Rombo wa Kulia. The Rombo country has no supreme ruler; each village has its own chieftain. Being well received at one village is, therefore, no guarantee for being allowed to peacefully pass other villages, and so we discovered. , About an hour after leaving Mkinabo's village, we began to skirt the lower edge of

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* In these regions streams often run a large part of their course underground. In such cases the watercourse on the surface only has water in times of flood.

Rombo wa Kulia. The men turned out of their villages in numbers and watched us pass. At first they ran along parallel to our route, sometimes dancing and waving spears and shields, and sometimes abusing our guides. We marched past them quietly for six or seven miles, not appearing to notice their threats, though prepared for attack. We then approached their northern boundary. Misunderstanding our forbearance, the natives began to close on our rear, throwing heavy stones. When the more advanced had come within about 30 yards, I saw that there was no help for it, and gave orders to fire. The fire of my people was not accurate, but the Rombo men gave back. They soon fled, although they did not lose more than one or two of their number. On our side ten or a dozen men had been bruised by stones, but no one was much hurt. It was then nearly dark, and, not being sure how we should be received in Useri, we descended into the plain, going the next day to Useri camp, then to the Kimangelya camp and to Laitokitok camp.

At Laitokitok we encountered the Masai in some numbers. Having heard at Taveta that the Masai were nearly exterminated by famine, we had not come provided with the proper presents for them. I had to choose between pushing on against their wishes or going back. Having regard to all the circumstances of the case, that is to say, to the tenor of my instructions, to the small number and poor marksmanship of my armed men, and to the fact that I had obtained the geographical knowledge required for present necessities, I determined to give the Masai other presents, and to return to Taveta.

We went to Taveta along the road, and, having paid a short visit to the hospitable Captain Johannis at the German station of Marangu we explored the western part of Taveta territory. We returned to Taveta, and then made for the coast by the way we had come, except that from Katulifetha Imam Sharif went by way of Bwiti.

After reading the preceding the question will occur to many, What are the real capabilities of these districts? In answer I cannot do better than quote a report on the subject by Mr. Imam Sharif, a gentleman well practised in judging the value of land.

IMAM SHARIF, KHAN BAHADUR, *to* COMMISSIONER SMITH.

Zanzibar, March 25, 1893.

Sir,

In accordance with your request, I have the honour to submit to you my opinion with regard to the capabilities of the soil in the parts which we have lately visited.

Firstly, with regard to the parts near Wanga, which are flooded by the Umba. Here we have a red soil, over which black mud is carried by the river floods. The soil appears suitable for sugar-cane, Indian corn, millet, cotton, tobacco, rice, etc., many of which products are already grown there. The ground is, however, mostly uncultivated and covered with jungle.

Secondly, the ground between the Umba and the Usambara hills. In time of rain, this is probably mostly black mud. In the dry season, there is no water. But there is no reason to suppose that it would not be obtained by digging. The ground is at present covered with thorn trees. Except for that, it reminds me of the Punjaub between Delhi and Lahore, which is a thickly populated region. The soil in this part is, however, much superior, especially in being stoneless. It would grow millet and kodo, and perhaps rice in parts.

Thirdly, the district extending from Jombo to Ndea. The soil is undoubtedly very rich, and though at present no water can be obtained, it could, I am sure, be got by digging wells. It would grow rice, tobacco, Indian corn, cotton, and vegetables.

Fourthly, the level ground from Ndea to Ndui ya Rombo, near to the Jipe lake. This ground is not much higher than Jipe lake. Part of it is black ground, swampy in rain, and part is red earth. The whole appears very fertile. The elevation above the sea is about 3230 feet. The black earth would grow rice and tobacco; the red soil would grow cotton, wheat, Indian corn, bananas, indigo, water-melon, and all sorts of Indian vegetables. It can easily be watered by canals from the Lumi river and by water-wheels from the Jipe lake.

Fifthly, the Taveta forest. Here the water seems to be everywhere under the surface. The soil is very rich, and will grow all the above products. There is also already a great quantity of timber, though I do not know the quality of the wood which could be cut.

Sixthly, the lower slopes leading up to the Kilimanjaro. In this is included the parts of Taveta which lie to the west of the forest, and the slopes below Rombo and Kimangelya. Here we have an altitude of about 4000 to 5000 feet. The soil is deep and without stones, and much superior to parts near Dehra Doon, where coffee and tea are grown with great success. Water is not at present to hand in many parts, but could, no doubt, be obtained by wells. The soil would have rich harvests of wheat. At present it is covered with grass, which appears very rich.

I have, etc.,
(Signed) IMAM SHARIF, K.B.,
Survey of India.

It will be seen that much of the country we visited has a very rich soil. Until the questions of water, labour, and transport are satisfactorily solved, it is not likely that the more valuable products, such as tea, coffee, spices, will be grown so as to give great profits to European planters. But short of this, which some think the chief use of a tropical country, a very large proportion of the parts we visited is capable of supporting a numerous population of natives of hot countries. Large areas now unoccupied might be inhabited by farmers from the crowded parts of

India. The land is at present empty, and until it is populated there cannot be a great trade. On the other hand, it seems probable that there would be a considerable trade if the land were fully populated. But the Masai must first be taught not to raid, the petty wars amongst the tribes must be put an end to, and kidnapping must be suppressed. These points attained, the natural increase of the indigenous population would soon overrun the parts now vacant. But the available space is vast, and there is plenty of room for immigrants. If I am right in believing that land for cultivation is the chief want of many districts in India, I would submit that no greater benefit could be conferred on them than to put in the way of emigration those inhabitants who can be induced to do so; and that, looked at from the African point of view, the measures which are calculated to populate the country are also those best suited to create trade.

The way we went has no very long stretches without water, and but seldom passes over uneven ground. If order were assured, the route by way of the Umba would be one of the most convenient roads to the Kilimanjaro, for there is always water [*] in the river, and one spot on its banks is as good as another for camping. The long waterless marches which have to be made on the Bwiti road to the south and on the Mombasa road to the north would be avoided. From Mr. Imam Sharif's report, it appears that most of our route passes through cultivable land. If this route ever comes into use, I imagine that the port of Wasin, though smaller than Mombasa, would be found quite convenient for steamers; for dhow traffic it is more accessible than Mombasa.

NOTE TO MR. C. S. SMITH'S MAP.[†]

A manuscript "Memoir" [‡] on the surveys conducted by Mr. Smith in 1892 as British Commissioner for delimiting the Anglo-German boundary between the mouth of the Umba river and Kilimanjaro, has been deposited in the Society's map-room, where it may be consulted.

During the first season—February 5 to March 28, 1892—the work was confined to the mouth of the Umba river and the immediate vicinity of the coast. Vanga was taken from the Admiralty chart; a small base-line was measured by the late Herr Vogler, of the German Commission; and the latitudes of three camps were determined by meridian altitudes of stars taken with a sextant. During the second campaign—July 7 to December 2, 1892—the whole of the triangulation and the plane-tabling of the rest of the country mapped was carried out. The instruments used included a six-inch theodolite, a six-inch sextant, two chronometers, two aneroids and heliographs.

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[*] At Perani, in August, the flow of water in the Umba was 8000 gallons a minute.

[†] Consul Smith is a lieutenant on the retired list of the Royal Navy.

[‡] The Convention, together with maps and triangulation chart, was laid before Parliament in the Bluebook, marked "Treaty Series, No. 14, 1893." In the maps made by the British members of the Delimitation Commission, nothing has been inserted which was not observed by themselves, except parts of the coast-line.

The triangulation upon which the survey depends has as a base a line drawn from the summit of Jombo Hill to the Theodolite Station near to Baba Kilulu Village. The length of the base was found from the difference of latitude and reciprocal azimuths of its ends. This value was checked by comparing the triangulated and astronomical latitudes of Vilima Viwili Hill Station, a point where it was thought there would be no local attraction. The base was finally taken as measuring 124,063 feet. The results of a small triangulation connecting Vilima Viwili with the boundary-mark on Lake Jipe show that this value is probably a few feet too small; but as the mean error of the triangulation reduced to sea-level does not appear to exceed about 0·14 per cent., the doubt as to the exact length of the base does not materially affect the final results.

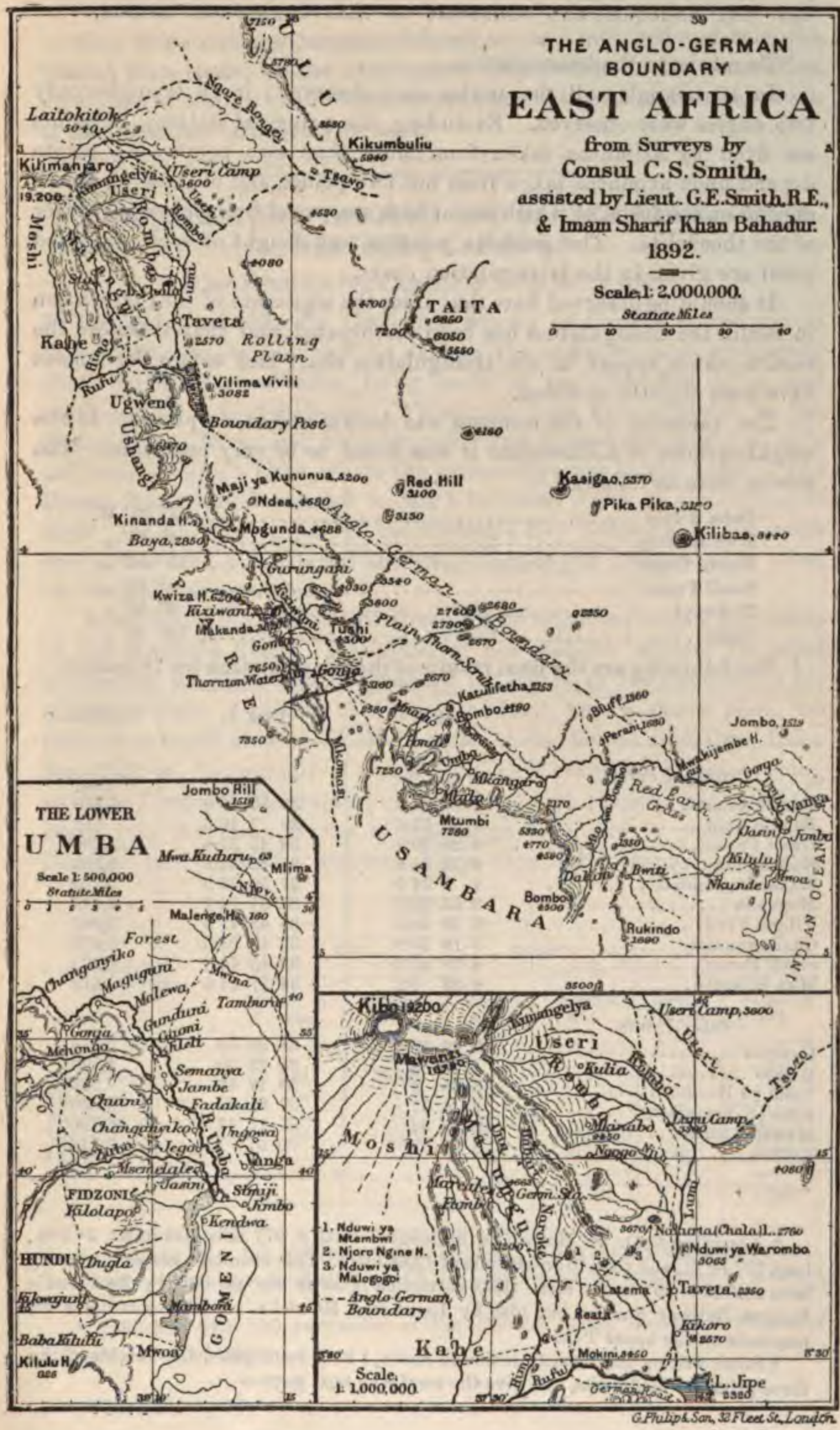
The longitudes throughout depend upon that of Jombo summit, which is assumed, on the authority of the Admiralty Chart No. 1390, to be 39° 12′ 56″ E. of Greenwich.

The latitudes of eight points were astronomically determined by sets of circummeridian altitudes of stars north and south of the zenith. The latitudes of the north and south ends of the base depend upon 78 and 120 observations respectively; that of Vilima Viwili upon 56 observations. The average number of observations for latitude taken at each point is 74. Each astronomical Station is linked to the trigonometrical system, but the trigonometrical values have been adopted. At certain Stations the local attraction was calculated.

At each principal Station azimuths were astronomically observed. The general accuracy of the orientation of the survey is tested by theodolite bearings taken from Great Perani Hill Station to Kibo summit, a distance of 136 miles, and to Maji ya Kununua, a distance of 70 miles. In the first instance, the difference between the observed azimuth and that calculated from the computed latitudes and longitudes of the two points amounted to 27″ of arc; in the second case, to 1′ 42″. The first comparison is thought by Mr. Smith to be more trustworthy than the second.

When surveying, it was impossible to erect marks in front, but quite good results were obtained by observing to the highest points of the hills. The intersection of the vertical and horizontal wires of the theodolite telescope was found a sufficient guide to the exact positions of the summits.

The heights of a few intermediate points are from aneroid observations; but those of all the triangulated points depend upon vertical angles of the theodolite. The datum is high-water mark spring tides at Vanga.



G. Philip & Son, 32 Fleet St., London.

To return to the triangulation.

In 10 triangles all the angles were observed; in 76 triangles only two angles were observed. Excluding the principal stations, 11 points are fixed by azimuths taken from more than two points; 45 points depend upon azimuths taken from but two points, and of these 15 points depend on azimuths, of which one or both were read from only one vernier of the theodolite. The geodetic position and height of each computed point are given in the triangulation chart.

It should be observed here that since the signature of the Convention in Berlin the triangulation has been recomputed, and that therefore the results which appear in the triangulation chart laid before Parliament have been slightly modified.

The variation of the compass was determined at six places. In the neighbourhood of Kilimanjaro it was found to be very uncertain. The results were as follows:—

Baba Kilulu	8° 34′ W.
Mwa Kuduru	8° 46′ „
Perani Camp	15° 52′ „
Small Perani	8° 12′ „
Kiziwani	8° 52′ „
Chala	10° 29′ „

The following are the final results of the triangulation for 16 points:—

	Lat. S.	Long. E.	Altitude.
Principal Points.	° ′ ″	° ′ ″	Feet.
Jombo, summit	4 26 21·3	39 12 56·0	1,519
Baba Kilulu	4 46 12·6	39 7 46·6	511
Great Perani	4 28 10·9	38 45 31·8	1,680
Katulifetha	4 23 24·8	38 22 32·1	2,153
Makanda, summit	4 9 24·0	37 59 20·9	3,829
Mogunda	3 55 33·3	37 51 12·7	4,688
Vilima Vivili	3 34 49·3	37 48 11·3	3,082
Chala, summit	3 19 29·9	37 41 21·3	3,672
Small Perani	4 29 24·3	38 45 40·0	1,365
Mwa Kijembe	4 33 6·2	38 57 24·6	613
Other Points.			
Kasigao	3 49 47·5	38 39 56	5,370
Bombo	4 25 9	38 22 30	4,190
Taita ya Bura	3 25 2	38 17 42	7,200
Kibo (Kilimanjaro) *	3 4 52	37 21 33	19,230†
Mawenzi (ditto)	3 5 52	37 27 41	16,790
Kilibas	3 57 52	39 57 1	3,440

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* According to Dr. H. Meyer (‘Mitteilungen,’ 1893, p. 97) Kibo lies in lat. 3° 3′ S., long. 37° 14′ E., and rises to an altitude of 19,680 feet. This mountain has consequently been shifted 7′ 30″ to the east. This correction is borne out not only by the Victoria Nyanza Railway Survey, but also by Lieut. von Höhnel's recent observations for longitude on the upper Tana.

† Since writing the memoir reviewed above, I have recomputed the heights of the three principal landmarks, and give the results on next page—

The Maps which accompany this paper have been reduced from the Official Map issued by the Intelligence Department of the War Office, on a scale of 4 miles to the inch, except that of the coast district, which is on the scale of 1 mile to the inch.

AN EXPEDITION THROUGH THE BARREN LANDS OF NORTHERN CANADA.*

By J. BURR TYRRELL, M.A., B.Sc., F.G.S.

In the spring of 1892 the Geological Survey of Canada placed me in charge of an expedition sent to explore the unknown area, embracing about 60,000 square miles, lying north of the Churchill River and south-east of Lake Athabasca. We started from Prince Albert on the Saskatchewan River, and, travelling overland, crossed the height of land, and reached Green Lake, where the canoes were put in the water. The Beaver River was descended to Isle à la Crosse Lake, on the Churchill river. At the trading-post of the Hudson's Bay Company, at the south end of this lake, a half-breed and two Chippewyan Indians were taken on the party as canoemen.

After descending Churchill River for 90 miles, we began the ascent of the Mudjatic River. We toiled at our paddles against its rapid current for ten days, until we reached its source in the middle of a flat sandy country. Crossing the height of land, here a sandy plain, we reached a small stream, which in a few miles flowed into Cree Lake. Standing on the summit of a rocky hill, on a beautiful bright evening in July, I enjoyed the rapture of being the first civilized man to look down into the clear depths of this large lake, and to gaze into the distance over its shining waters. Three days were occupied in crossing

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Station.	Kibo.		Mawenzi.		Taita ya Bura.	
	Dist. in miles.	Height in feet.	Dist. in miles.	Height in feet.	Dist. in miles.	Height in feet.
Great Perani........	136	19,220	—	—	79	7172
Makanda	—	—	—	—	55	7187
Mogunda	—	—	—	—	46	7199
Vilimi Vivili	45	19,270	40	16,785	35	7229
Chala	—	—	21	16,798	42	7215
				16,790		7200

As regards Kibo, the observation from Vilima Vivili is clearly the most reliable, but further observations are desirable. Of the other results the mean may be taken.—C.S.S.

* Published with the permission of the Director of the Geological Survey of Canada. Map, p. 480.

it, and then began the descent of the rapid stream which flows from its northern end. The lake lies on the line of contact of the highly altered Archean and the unaltered Palæozoic (Keewenawan) sandstones, and the river flows through country underlain by these latter rocks to the mouth at the south end of Black Lake. Black Lake was crossed and Black River was descended to Lake Athabasca, near the east end of which was a small trading-post of the Hudson's Bay Company. Black Lake and this portion of Lake Athabasca were also found to lie along the line of contact of the altered and unaltered rocks, their northern shores being granites and gneisses, while their southern shores are horizontal sandstones. After obtaining supplies the party returned to Black Lake, and ascended Black River to its source in Wollaston Lake, that large body of water from which issue two almost equal streams, the one flowing to Lake Athabasca, and thence by the Slave and Mackenzie rivers to the Arctic Ocean, and the other to Reindeer Lake, and thence by the Deer and Churchill rivers to Hudson Bay. A survey was made of the west shore of this lake, which was also found to lie at the contact of the sandstone and the gneiss. Geikie River, called after the eminent director of the Geological Survey of Great Britain, was found to flow into the south-west angle of the lake; and here the party was divided, the assistant with two canoes and four men being sent south by the regular Indian route through Reindeer Lake, while with one canoe and three men I ascended Geikie River to its source, crossed some low rocky hills which here constitute the height of land, and entered a beautiful lake surrounded by wooded rocky hills, which was called Foster Lake, after Dr. George Foster, the Finance Minister of the Dominion of Canada. We descended Foster River, portaging our stuff and canoe past its many wild falls and rapids, till we reached Churchill River, up which we travelled to Isle à la Crosse, and thence to Prince Albert. During the season we made 1300 miles of new surveys, 540 miles of which were on routes that had never before been travelled by white men, and 260 miles without guides of any kind except our instruments.

Further to the northward lay the great treeless area of the Barren Grounds. One of my Indian canoemen had been there many (30?) years before, and would occasionally speak of the life led by him at that time, and of the nature of the country through which he had to travel. With his aid I learned of four canoe routes used by the Chippewyan Indians in their annual deer-hunting excursions to the edge of the barren grounds. Two of these routes were said to lead from two points on the northern shore of Lake Athabasca, one from the northern shore of Black Lake, and one from a point on Ice River, north-east of Wollaston Lake. All led through lakes and streams to the height of land, beyond which water was known to flow to the north, but, with the exception of the last route, nothing was known of the ocean to which these waters flowed. The last route was said to lead through Kasbatua or Ptarmigan Lake, and down the Kazandeze or Ptarmigan River to Hudson Bay. Indian sketches were obtained of all these routes.

On my return from the north, I offered to conduct an expedition through the Canadian Barren Grounds on one of these routes. The course from Black Lake was recommended as being the one likely to lead to the most important and extensive geographical and geological results. In the beginning of April instructions were received from the Director of the Geological Survey to prepare for an expedition. It was then too late to make any arrangement with the Hudson's Bay Company's fur traders on Lake Athabasca, but a letter was despatched to Isle à la Crosse trading-post on the Churchill River to send my old canoe used last year with two good canoemen, to meet me early in June on the Athabasca River, while three Iroquois canoemen were obtained at Caughnawaga, near Montreal, and J. W. Tyrrell, C.E., a surveyor who had already spent two summers and one winter on Hudson Bay and Straits, and who spoke the Eskimo language readily, was engaged as topographical and botanical assistant and Eskimo interpreter.

On May 7 the writer left Ottawa, the capital of the Dominion of Canada, for Edmonton, a terminus of the Canadian Pacific Railway on the Saskatchewan River. Two cedar canoes, each 18 feet in length, and with a carrying capacity of about 1800 pounds, had been sent on ahead from Peterborough, Ontario, but they did not reach Winnipeg until the day after our arrival there, and from there they had to be taken on by express with the party to Edmonton. At Winnipeg a circular letter was obtained from Mr. C. C. Chipman, Commissioner of the Hudson's Bay Company, to the officers in charge of all the northern trading-posts, instructing them to furnish me with any necessary supplies.

The provisions for the voyage were obtained at Edmonton, from which place we drove northwards with horses and carriages to Athabasca Landing, on the Athabasca River, where we put our canoes in the water, and on the evening of May 31 we started down the stream towards Lake Athabasca, leaving most of the provisions to be brought after us by the stern-wheel steamer belonging to the Hudson's Bay Company. These provisions did not reach Fort Chippewyan, on Lake Athabasca, until June 20, causing the party a delay of about ten days; but some of this time was improved in making a collection of fossils from the tar-bearing sandstones on the Athabasca River, from which no fossils had before been obtained. At Fort McMurray, on the Athabasca, we were joined by the canoe and two men from Isle à la Crosse, bringing the party up to a total of eight men and three canoes.

On June 22 we loaded our three canoes with all they would hold, and, bidding good-bye to the last traces of civilization, started from Fort Chippewyan along the north shore of Lake Athabasca. Here the survey must begin, for the shore ahead of us for 160 miles was unsurveyed.

The instruments carried for the work were one Hadley sextant with arc of 8-inch radius, one Gurley's solar compass, two Massey's floating boat-logs, one camera, one mercury artificial horizon, one pocket-chronometer, three good American watches, three prismatic compasses, one aneroid barometer, maximum and minimum thermometers, etc.

The north shore of Lake Athabasca was surveyed with the solar compass and floating boat-logs, checked by observations both for latitude and longitude. The rock was found to be red and grey Laurentian granite, gneiss, often highly garnetiferous, dark green Huronian schists, and white quarzites, the latter occasionally mixed with heavy beds of hematite and limonite, and reddish unaltered sandstones, of Cambrian (Keewenawan ?) age.

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The Hudson's Bay Company's trading-post of Fond du Lac, near the east end of the lake, was found to be deserted, and we continued eastward over our track of last year until we reached the north shore of Black Lake, where the Indian canoe route strikes off to the north. Here we were to leave all beaten paths, and to strike into the unknown wilderness, without any other guide than the little Indian map obtained the year before. To reach Black Lake from the west, we had been obliged to portage or carry our canoes and all our goods across two stretches of land with a total length of six miles and a half, and now everything had again to be carried over a portage which proved to be two miles and a quarter in length, and which brought us to the shore of a small rock-bound lake on a brook tributary to the Chipman River. This lake has an elevation of 200 feet above Black Lake, or 1200 feet above the sea. We then crossed six small lakes and an equal number of portages, the latter of which averaged nearly a quarter of a mile in length, until we reached Chipman Lake, a very irregular body of clear water surrounded by rugged granite hills. More than a day was spent in this lake looking for the mouth of the upper part of Chipman river. When found, the river was ascended through long narrow lake-like expansions of quiet water, up strong currents, and past five rapids, where we were obliged to portage our canoes 80, 1100, 300, 20, and 930 paces respectively. The last portage terminates at the south end of a large lake locally known as Big Lake, but which is here called Selwyn Lake. It has a length of 55 miles, and an elevation above the sea of about 1350 feet. The shores are generally wooded, the last portage being through a forest of small black spruce and birch, while some aspens are growing on the sides of the hills, and a few white spruce, up to 16 inches in diameter, rise from the stony flats by the streams. The temperature of the water in this lake was 58° Fahr. on July 15.

From the north end of this lake a portage a mile and a half in length leads across the height of land through woods of black spruce, over a morainic ridge, beside a wet valley closely wooded with tamerac, to a lake lying 50 feet lower than the last. This lake I have called Daly

Lake, after the Hon. Thomas Daly, Minister of the Interior for Canada, under whose direction the expedition was sent out. After having travelled northward on this lake for 20 miles, a heavy west wind delayed the party a day and a half, camp being pitched behind a long ösar of sand and gravel, which extended off into the distance in a direction south 40° west. Here a few small aspens were seen, marking the northern limit of this tree, while an occasional small white birch might be found in the thinly scattered groves of tamarac and black spruce, which are everywhere draped with festoons of long threadlike black lichen (*Alectoria jubata*). This lichen is one of the principal articles of food of the Barren Ground caribou in winter, when the ground is thickly covered with snow.

Around Daly Lake are many gently sloping stretches of bright green turf, looking like the beautiful green fields that were now so far to the south of us. Their surface was quite firm to walk on, and was covered with a thin growth of light green lichen, low bushes of cranberry, eyeberry, dwarf Labrador tea, etc. On digging below the surface, I found the subsoil to be composed entirely of bright yellow moss (*Sphagnum sp.*), which had ceased to grow, mixed with a few pieces of wood. At the depth of about a foot the moss was frozen together into a solid mass of ice. On the upper side of these open green fields there is usually a spruce swamp, where the moss is still growing beneath the shadow of the trees, while at the edge of the lake, perhaps half a mile distant, and from 10 to 40 feet lower down, are light yellow vertical or overhanging cliffs of peat, from which large masses of peat are constantly falling on the sandy beach. Digging in a short distance with my hammer into the face of the cliff, which averaged 12 feet in height, we soon reached the frozen moss; through it were many streaks of clear ice. It would appear, therefore, that these sloping bogs are growing on their upper sides, that they then become frozen and cease to grow, and move slowly down the gentle slopes, like true glaciers, until they are undermined by the waves, and break away in cliffs on the border of the lake.

At the north end of Daly Lake we entered a stream which is known to the Chippewyan Indians of Athabasca as the Telzoa, or Wide Shallow River, and camped, on July 23, on the mossy bog near the head of a rapid, where the river is spread thinly over a bed of boulders for a width of 250 yards. On its south side it had no other bank than the wall of moss and ice along the face of the bog.

While within the forest we had been tormented both day and night by immense swarms of mosquitos, but now, in the more open country, the black flies made it almost impossible to move about with any portions of our hands or faces uncovered.

The country that we had been passing through, all the way from Lake Athabasca, had been gently rounded rocky hills of Laurentian gneiss rising here and there through the sandy and stony till; but here, in north latitude 61°, west longitude 104°, the river enters a flatter country, now expanding into small irregular lakes, and again contracting into swift rapids over boulders. The banks are everywhere ill-defined, and there is no sign anywhere of the stream having cut out a channel for itself. The country is generally low and mossy, dotted with occasional groves of small black spruce. Here and there long ösar of sand and gravel extend across the country in a direction 60° S. 70° W., parallel to the direction of glaciation, keeping this course entirely regardless of surface contours. On the sides and crests of these ridges are groves of fine large white spruce rising to the height of 50 or 60 feet, and measuring 6 feet in circumference 2 feet above the ground. These trees were much the finest that we had seen anywhere since leaving Lake Athabasca.

Further northward, the country became more stony, and the west shore of Barlow Lake, in lat. 62°, is composed of low hills of boulders and irregular masses of granite. Trees are confined to a few isolated groves on the banks of the stream.

It was now five weeks and four days since we left Fort Chippewyan, and our provisions were disappearing rapidly, for we had seen no game that we might add to our stock from time to time; but on the evening of July 28, my brother shot a small poor doe on an island opposite our camp. The next morning, as we were paddling across Carey Lake, making for a high point with a huge boulder lying on its summit, one of the men drew my attention to an immense herd of caribou on the eastern shore. They were standing on low flat land, feeding on soft grass, and endeavouring to catch a little of the breeze from the lake, which gave them some relief from their habitual summer tormentors, the black flies. Swiftly, but quietly, we paddled to the shore, and that afternoon was spent in shooting a number of the best bucks of the herd. The continuance of the exploration depended on our obtaining an abundant supply of meat, and the knowledge of this fact added to our excitement, as we stood in the midst of the tens of thousands of deer, as they ran madly to and fro, endeavouring to escape from a danger which they could not understand. That evening we were tired as we returned to camp, and the men collected sixty-eight tongues from the deer that we had killed. I had determined, if possible, to kill fifty, but we had rather overshot the mark.

Our camp was close to a small grove of stunted black spruce and tamarac. The past ten days had been cold and wet, but the next three days were bright and warm, with a dry south-west breeze, and in that time we cut up and dried about twenty-five of the best of the deer that we had shot. Immense herds were still about us, but we did not shoot any. Instead of our rifles we took the camera, and, walking gently, we would often approach within a few yards of the animals as they were quietly grazing, and thus managed to secure thirty-seven photographs, showing the herds of deer in various positions. The animals were very lean and poor, but we prepared between 250 and 300 lbs. of jerked meat from the twenty-five that we were able to dry.

On August 1, leaving one man to attend the drying meat, we paddled over to the high point two miles north-west of camp, towards which we had been travelling when we first saw the deer. The point is a long sloping ridge 150 feet high, trending S. 75° W. Its surface is composed of boulders, chiefly of red granite, embedded in yellow sandy till, while on the southern side is an outcrop of coarse red granite, containing large crystals of pyrite. On its crest is a large boulder, 9 feet high, of coarse red porphyritic granite. On the top of this boulder we erected a cairn of stones, under which we put a Worcestershire sauce-bottle, with a short record of our trip to that time, and a sketch-map of the course followed. In the centre of the cairn we planted a pole, from the top of which floated a Union Jack. Giving three hearty cheers, we returned to camp.

On August 2 we packed our dried meat in bales, and were off by nine o'clock. We paddled past Cairn Point, and across the lake to a small brook, at whose mouth is a grassy glade wooded with white spruce (*Picea alba*), some trees of which were 8 feet in circumference 2 feet above the butt, and 40 feet high. Beyond the brook is a high hill of bare red, whitish wreathing granite, the first hill of bare unbroken rock that we had seen for many days. During the next few days several bad rapids impeded our progress, and we followed the winding shores of several small lakes, in one of the last of which we came to a small island of almost horizontal and undisturbed white limestone of Cambro-Silurian age, very similar to the Trenton limestone in Lake Winnipeg. This small outline is of great interest, as giving some slight clue to the former great extension of the Palæozoic limestones over much of the north country.

Patches of snow on the sides of the surrounding hills now reminded us that we had reached a sub-arctic region.

On August 6, from the crest of a low hill near the last grove of small black spruce, we saw before us a great lake apparently covered with a solid sheet of ice. Our journey by water seemed to be at an end, and the men were anxious to turn back; but we pushed on, and when we reached the lake we found a narrow lane of open water close to the shore on which we could travel with our canoes between the ice and the land. The mist rising from the ice generally prevented us from seeing the lake at all clearly.

Shortly after entering the lake we were delayed for three days by a heavy storm of wind and cold rain, which afterwards turned to snow; and on the morning of August 11, as we were leaving camp, there was a thin skin of ice on the tarpaulins. That day we found the ice tight against the shore around the point of a high peninsula, and were obliged to search for a narrow place where we could carry our canoes and loads across to the open water beyond. The same evening we reached another point against which the heavy ice was crowded, and as it was too late to attempt a portage, we camped for the night at the mouth of a rapid brook, where he had hoped to have found a few willows for fuel. No willows could be found, but the men succeeded in boiling water for tea with some green dwarf birch (*Betula glandulosa*).

The next morning we had the pleasure of seeing a clear channel of open water between the point and the ice, along which we were able to paddle with our canoes. We followed the shore inside of some long rocky islands, between the ice of the lake and the land. The shore everywhere descended easily in beautifully green slopes to long sandy beaches between rocky points. The country through which we had been passing all the way from Lake Athabasca had been underlain by red and grey granitoid gneisses of Laurentian age, but here we entered a country underlain by sandstones, conglomerates, red quartz, porphyries, and dark green traps precisely similar to the Keewnawan or Upper Copper-bearing rocks of Lake Superior, and probably of the same age.

We followed the shore of the lake closely, searching for the river that flowed out of it, until the evening of August 15, when another cold storm of wind and rain delayed us for two days. On the evening of August 17 we found the outlet of the lake, having followed the shore for 117 miles. The water in the lake is clear and pure, though it has a flat taste like snow-water. Whitefish are very plentiful in it. The lake is probably the Doobaunt lake which Samuel Hearne walked around in 1770, and it appears to be deep and of large extent, but its southern and part of its eastern and western shores were not seen.

The river discharging it, which flows from the bottom of a bay at its northern end, at first winds gently between sloping grassy banks, often covered with boulders. Here we saw the first unmistakable signs of an old Eskimo encampment—stone circles, dog whip-handles, stone arrowheads, pieces of the ribs of kyacks, etc.

A few miles below the lake the river rushes through a narrow gorge caused by the decay of a trap dyke, which has risen through the surrounding Keewenawan conglomerates. Past this gorge it was necessary to make a portage 2¼ miles in length. At its eastern end the portage runs over sandy ridges and terraces which appear to represent old raised sea-beaches, with an approximate elevation of about 400 feet above the present sea-level.

The next day, after crossing the portage, we paddled across a small lake and down the river till within a few miles of Lady Marjorie Lake, where we saw a solitary deerskin tent on the right bank, 10 feet above the water. Very soon we saw Eskimo running about, and it was evident that the camp was in consternation, for they had seen our three canoes coming down the river from the land of their hereditary enemies, the Chippewyan Indians. When we were within hailing distance, my brother called out, "Chimo, Chimo; Ta'appe tacco Innuit; Kudluna awunga" ("Peace, peace; we are glad to see Eskimo; we are white men"), on which a number of people rushed from the tent and answered, "Chimo, Chimo." We pulled in to the shore, and were met on top of the bank by a tall, fine-looking Eskimo with a spy-glass in his hand, and wearing a pair of moleskin trousers and a deerskin coat. He was quivering with nervousness, but after we had shaken hands I presented him with a plug of tobacco, which set him more at his ease. My brother talked to the man for a few minutes, and then the women unlaced the front of the tent, which had evidently been tied up as tightly as possible, and invited us to come in. The tent held one dual family consisting of one man, two wives, and five children. The man drew us a rough map of the river down to salt water, but he could give us no idea of the position of the mouth of the river, and he appeared to know nothing of Marble Island or the coast of Hudson Bay. However, the fact that this man had a telescope, two old guns, and a pair of moleskin trousers, assured us that he belonged to the Eskimo of Hudson Bay, rather than to those of the Great Fish River and the Arctic Ocean.

After remaining a few hours with this friendly family, we proceeded on our way, hoping to meet other camps of Eskimo on the banks of the river from time to time, and to gain additional information from them.

On Lady Marjorie Lake, where we spent two days in a search for our course, being delayed by heavy winds, we shot several fine fat bucks, and replenished our supply of fresh meat. Shortly after leaving this lake we travelled north-westward, down a well-defined river, and our hearts sank as the river took us further and further towards the north-west, for we were making straight for the Great Fish River, which flows into the Arctic Ocean, and while we were only about 100 miles from that river, we were 350 from the nearest point on Hudson Bay. At length we reached a wide sandy plain, on which we were overjoyed to see willows growing, while around were scattered drifted trunks of spruce trees a foot in diameter, and limbs of balsam poplar. We had reached the mouth of the west branch of the Telzoa River, the banks of which must be wooded not far above the forks.

It was August 25, we were in north lat. 64° 36′, and the night was cold, so that we enjoyed the luxury of a fire, while the men baked bread and boiled a large supply of meat. Our safest plan of operations was now to ascend the west branch of the river and reach the wooded country before the winter set in, and find our way to Great Slave Lake, or back to Athabasca Lake. But I could not forego the pleasure of tracing to its mouth the great river that we had descended so far. Therefore the next day we pushed on to Aberdeen Lake, whose gravel shores were still deeply scored by the shoving of the spring ice. That evening I called the men together and told them that they had a long journey yet before them, that the summer flowers had all withered, and that winter would very soon be on us. If they wished to reach their homes they must exert themselves to the utmost. After that I had no reason to complain of their unwillingness to work. We continued our journey eastward, losing one day in a search for the outlet of Aberdeen Lake, and two days from a heavy storm, until on September 2 we reached the west end of Baker Lake, where old Captain Christopher had been before us more than a century and a quarter ago. We had now accomplished our journey through the unknown interior country, and had gained the first recognizable point since leaving Black Lake, 810 miles behind us. The shore ahead of us was still practically a *terra incognita*, but we knew that by following it we should eventually reach Fort Churchill. We had surveyed a line of the above length through the very middle of the area that we had set out to explore. Of the distance 538 miles were over lakes, where the distances were measured with a Massey's floating boat-log, and the bearings taken with a solar or prismatic compass; 272 miles were on rivers, where the distances were estimated and the bearings taken with prismatic compass; but the distances thus obtained were constantly checked by observations for latitude and longitude. The lengths of the portages were obtained by careful pacing.

The stormy weather of autumn had now set in, and often prevented us from launching our canoes for several days at a time.

In the past month the small Arctic caribou had been plentiful in the country through which we were travelling, so that we had no difficulty in obtaining an abundant supply of fresh meat, but these animals now became very scarce, and on September 3 we shot the last deer of the season.

The survey with solar compass and boat-log was continued along the north shore of Baker Lake, which was found to lie along the line of contact of the Laurentian gneisses to the north, and the red Keewenawan conglomerates to the south, the former including bands of crystalline limestone. The Keewanawan rocks had been traced from Doobaunt Lake to Baker Lake, a total distance of 225 miles as the crow flies.

At the head of the river flowing from Baker Lake we met the incoming tide, and as the currents in Chesterfield Inlet were therefore very irregular, it was no longer possible to use the boat-log with any degree of accuracy, and the remaining distances were estimated, checked by observations for latitude and longitude. Chesterfield Inlet was found to be a deep narrow tidal fiord, with shore of red and grey granite and gneiss.

On September 12 we reached a rocky point just south of the mouth of Chesterfield Inlet, where the heavy waves, driven in from the open sea by a south-east wind, obliged us to struggle ashore, and prevented us from starting out again on the same day. Behind our camp was a sandy terrace in which the Eskimos had dug the basements of many of their snow houses or tents, while around they had stood up on end many huge slabs of stone. We now began the heavy task of travelling down the tidal shore of Hudson Bay in our little open canoes. During the first three days the weather was beautifully fine, and we covered more than 100 miles of the distance, so that there appeared to be every chance of our reaching Fort Churchill on open water. To the right lay the bold rocky shore of dark green Huronian schists, while to the left Marble Island raised its bare white hills out of the dark-green ocean.

On the evening of the third day, as we were about to cross Corbett's Inlet, a heavy wind sprang up from the south-east, and forced us to camp on a small sandy island, where we were obliged to remain for a day and a half. On September 17 the wind went down, and we started to cross the 7 miles of open water which lay between us and the south side of the inlet. When about midway of the distance, a heavy north-west wind sprang up and increased to great violence, so that every moment we were in danger of being engulfed by the waves which broke over us, until we ran behind a projecting reef and were safe, but wet to the skin with salt water. Storm after storm now broke over us, and in twenty days, from September 15 to October 6, we were unable to advance more than 120 miles.

On the morning of September 20 the ice was three-quarters of an inch thick on the small ponds on the rocks; on the 22nd the ground was covered with a heavy fall of snow; and on the 25th we walked 20 miles, often on the crusted snow, in search of game, but all that we were able to shoot was one ptarmigan, which we divided for dinner.

Shortly afterwards one of the men had the good fortune to shoot a white bear, and for the next five days, during which time a heavy storm was raging, we subsisted on the meat of this animal. We had been able to collect some lichens and small plants from the tops of the knolls, and with these we occasionally made a small fire; but on the night of October 3 the wind went down, and the snow fell quietly and peacefully, covering hills and valleys with an even white sheet, and burying all the reindeer moss, so that there was no chance of obtaining even that any longer for fuel. This made our condition almost desperate, for we were then 270 miles from Churchill, on a bleak coast, with only a few pounds of bear's fat for food, without fuel, and 200 miles from the nearest wood. Two more days were spent struggling southward in our canoes, but at night and morning we had to carry canoes and cargoes a long distance to and from dry land, and, though we worked hard, we made only 12 miles.

On October 6 the winter had settled down on us with all its arctic rigour, and even in the sun at midday the thermometer remained considerably below freezing-point. We were without food or fuel, and our clothes were worn to rags. Two hundred and sixty miles of shore still lay between us and Churchill, the nearest point where we could obtain supplies. Our canoes were loaded with specimens of rocks and minerals which we had collected, both in the interior and on the coast. It was clearly impossible to reach Churchill travelling as we had been travelling, and I therefore decided to leave everything behind us which was not absolutely necessary for the safety of the party. The shore was a vast snow-covered plain, but a slight gravelly eminence was chosen, half a mile from high-tide mark, and on it one canoe, all our rock specimens, instruments and whatever else was not necessary for our existence, were carefully piled in a heap and covered with tarpaulins. Our note-books, photographs, and collection of plants, with guns, ammunition, blankets, and two tents, were put in the remaining two canoes, and thus lightened, and with four men with paddles in each canoe, we started southward again, determined to reach Churchill by water if possible.

The shore was very flat, with a tide of from 12 to 14 feet, and at ebb tide the water was generally several miles from the line reached by it at high tide, so that we were able to land or launch our canoes but once in each twelve hours, namely, at the time of high tide. Any rocks seen on the shore were Laurentian granites and gneisses.

We struggled onward for ten days, living on what few ducks we could shoot in the open water. The weather was very cold, and the water that was splashed over us by the wind froze on our clothes and beards. We had constantly to break the ice from our paddles, as they became too heavy for us to swing. When night settled down on us on October 14 it was ebb tide, and we were out among ice and boulders almost out of sight of land. That night we spent in our canoes, one of our men having both of his feet badly frozen, while another was sinking rapidly with an attack of dysentery. On the afternoon of the 15th we gained some solid ice, and hauled our canoes over it to the shore, where we pitched a tent just as a heavy storm of wind and snow broke over us. There was now driftwood on the shore, and with it we made a fire and cooked some ducks that we had shot, getting the first food that we had tasted for thirty-six hours. Assured that we were not very far from Churchill, I sent two men on foot through the snow to the fort for assistance, and on the afternoon of the third day they returned with four dog-teams, bringing us pork and flour, and on October 19 we were carried to Churchill. Here we obtained shelter with the clerk in charge for the Hudson's Bay Company, and we received every kindness from the Rev. J. Lofthouse, the missionary to the Eskimo for the Church Missionary Society; but fresh meat was not to be had, and the men gained strength very slowly on the limited diet of salt pork, flour, and oatmeal.

We remained here until November 6, when we crossed the Churchill River on the new ice, and started on snowshoes for York Factory. We had secured one dog-team from the Hudson's Bay Company to carry our provisions and the man whose feet had been so badly frozen, while the other men were obliged to haul their bedding on small toboggans. Other dog-teams belonging to the Hudson's Bay Company assisted us for part of the way, as they were going to recover some stuff that had been left on the shore between York and Churchill by one of their officers in the latter part of September, it being considered impossible to travel further by water so late in the season.

When we arrived at Nelson River, the scanty supply of provisions that we had been able to obtain at Churchill was exhausted. The river was found to be full of running ice, so that we were unable to cross it either in the boat which we found there, or on the ice, and our party, now augmented by three local Indians, was obliged to remain on its bank for ten days, subsisting on the few rabbits, foxes, etc., that we were able to catch. The weather had been very cold, the thermometer often falling at night to 20° Fahr. On November 24 we arrived at York Factory, where we were able to procure a plentiful supply of provisions. The officer in charge here for the Hudson's Bay Company is a medical doctor from Aberdeen, Scotland, and as Michel, the man with frozen feet, was unable to walk, and we were unable to obtain transport for him, we left him under the doctor's care, to be sent out with the winter packet.

We obtained another dog-team and provisions for twelve days, and on November 28 started on snowshoes through the deep unbroken snow for Oxford House, 250 miles distant. The country passed through was generally flat and swampy, and thinly wooded with small black spruce. Late on the evening of December 7 we arrived at Oxford House, tired and footsore after our ten days' walk. After a delay of six days, waiting for fresh teams of dogs, we again started and arrived at Norway House on December 20. Here the men from Isle à la Crosse and Prince Albert were paid off and sent home up the Saskatchewan River, while I obtained fresh dog-teams and drove southward across Lake Winnipeg to Lower Fort Garry, on the Red River, where we arrived on the evening of January 1, 1894, and the next day we reached Winnipeg.

During the course of the expedition we travelled, beyond our railway journeys, a total distance of 3200 miles, viz. 2150 miles in canoes, 610 miles on foot on snowshoes, 350 miles in conveyances drawn by dogs, and 100 miles in conveyances drawn by horses.

While so travelling we made the following surveys:—

Seven hundred and seventy miles over lakes, where the distances were measured with a Massey's floating boat-log, and, in order to avoid local attraction or weakness of the magnetic needle, the bearings were taken as much as possible with Gurley's solar compass. Two hundred and seventy-two miles of river, and 360 miles of the tidal shores of Chesterfield Inlet and Hudson Bay, where the distances were estimated and the bearings taken with a prismatic compass, the variations being constantly determined by the solar compass. Throughout the above distances observations were taken with the sextant and artificial horizon as often as possible both for latitude and longitude.

The remaining portion of the shore of Hudson Bay, between where the instruments were left and Fort Churchill, about 250 miles in length, was geologically examined, and the position of the mouths of the rivers roughly ascertained.

A careful track survey was kept of the route travelled over on foot from Churchill to York Factory, a distance of 200 miles, the bearings being taken with a prismatic compass, and a rough track survey was also kept through the 400 miles of wooded country from York Factory to Norway House.

A very full collection of plants, including 229 species, was made by my assistant, Mr. J. W. Tyrrell, in the new country passed through. We also took 260 instantaneous photographs, which illustrate the principal physical features of that northern country, and the immense herds of reindeer that roam over it.

Note on Mr. J. B. Tyrrell's Map.—On this map are shown the results of two surveys, made by Messrs. J. Burr Tyrrell and J. W. Tyrrell, in 1892–93. On the first expedition Cree Lake was visited; a survey was made of the west shore, Wollaston Lake, and the positions of other important points were fixed. On the second expedition the instruments used were an 8-inch sextant and artificial horizon, a Gurley solar compass, Massey's logs, photographic camera, chronometers and watches, prismatic compasses, aneroid barometer, and maximum and minimum thermometers. The north end of Lake Athabasca was surveyed and fixed by observations for latitude and longitude. At Black Lake all beaten paths were left, and from this point many important corrections and additions were made to the sketch-maps previously existing. The topographical results of these two expeditions have been carefully laid down on the map.

THE HISTORICAL GEOGRAPHY OF THE HOLY LAND.*

By COUTTS TROTTER.

The author of this work has carried out so successfully the task which he proposed to himself, that we may do well to state in his own words what his purpose in writing was. "What is needed," he says, "by the reader or teacher of the Bible is some idea of the main outlines of Palestine—its shape and disposition; its plains, passes, and mountains; its rains, winds, and temperatures; its colours, lights and shades. Students of the Bible desire to see a background and to feel an atmosphere—to discover from the 'lie of the land' why the history took certain lines and the prophecy and gospel were expressed in certain styles—to learn what geography has to contribute to questions of Biblical criticism—

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* 'The Historical Geography of the Holy Land, especially in Relation to the History of Israel and of the Early Church.' By George Adam Smith, D.D. With six maps. Hodder and Stoughton.

above all, to discern between what physical nature contributed to the religious development of Israel, and what was the product of purely moral and spiritual forces. On this last point the geography of the Holy Land reaches its highest interest."

It will be generally admitted that the climate and resources of a country, and the physical configuration, especially that of its frontiers as bearing on its relations with its neighbours, have a considerable share in moulding the national character, and directing the course of history. But in his last sentence above quoted, the author seems to ask somewhat more from "Geography" than this. He would ascertain not only its contribution to "religious development"—a sufficiently difficult question—but also the proportion which this contribution bears to the action of certain other forces of an exceptional character which, in the case of Israel, he seems to regard as differing in degree, if not in kind, from the ordinary leading of Providence in the affairs of nations. And this seems even to involve some inconsistency; for whereas, in dealing with other tribes and races, as the Philistines, the Phœnicians, or the people of Northern Palestine, he allows free scope to the ordinary influences we have referred to, in the case of "Israel" he finds the action of these to be much more limited, and to be supplemented or counteracted by the special spiritual insight which he attributes to this branch of the Semites, or by Divine intervention; and occasionally his illustrations appear to us hardly to support the weight of the inferences he would found upon them. We cannot, however, pursue this very interesting branch of the subject, which, though no adequate notice of the work could ignore it, hardly falls within the province of this *Journal.*

In dealing with the geographical integrity of Syria, the writer points out, what is not always borne in mind, that though its eastern limit is well marked by the deep gorge of the Jordan valley, Syria is nevertheless essentially a part of the Arabian peninsula. Ethnologically, also, this is very markedly the case. From all time Semitic tribes—Hebrews, Midianites, heathen and Moslem Arabs—have swarmed up into it from the east and south-east. They seem to have been always stopped, northwards, by the Taurus range, and westwards by the sea, with two famous exceptions, the Phœnicians and the Jews. The former were the early pioneers of commerce; the latter, bigoted, exclusive, and provincial in their secluded mountain territory, gave, in the fulness of time, to the western nations their monotheistic faith.

Dr. Smith observes that until and except under the great stimulus of Islam, the Semitic tribes were never capable of a national combination; Syria, indeed, as the highway for war and commerce between the great empires of the ancient world, could hardly have made herself an independent power. His singularly clear description, district by district, of the physical features of the country enables the reader to follow alike the movements of those great forces, and the not less interesting local campaigns and expeditions recorded in the historical books of the Old Testament. Recent criticism of these, combined with the labours of the explorers, has, as is well known, thrown much light on the Biblical narrative. These studies have, in fact, prepared the way for such a work as the present; without them neither the picturesque local colouring nor the historical deductions which give this work its charm and value would have had the same accurate foundation.

The "physical sketch map," p. 5, illustrates at a glance the writer's description of the main features of the country, to which, but always under reasonable limitations, he traces the characteristic qualities of the various inhabitants, and the vicissitudes of their history. For example, with reference to the two parallel belts of high land which run down from the Lebanon on each side of the Jordan, he points out that, whereas on the east side a region equal or superior to the western in natural resources had its prosperity always paralyzed by its proximity to the desert and the absence of any natural barrier against the plundering nomad tribes, the corresponding region, protected to some extent by the Jordan valley, and further by its own escarpments, had a very different destiny; Judæa being, besides, also isolated on the west, by a series of valleys and low hill country, from the Maritime Plain. As regards this last, we have again a contrast between the inhabitants of its southern portion, the Philistines, who, owing to the harbourless character of the coast, were never a sea-going people, and the dwellers to the north of Carmel, where the comparative frequency of sheltered points and inlets gave the Phœnician merchant his opportunity. Across the Maritime Plain, and by easy roads into the great plain of Esdraelon, lay the beaten track of Egyptian armies going north to Tyre and Sidon and Asia Minor, or eastwards by the valley of Jezreel to the Jordan and Damascus; the route also of Syrian, Babylonian, and Persian invaders. Later on, across Esdraelon came the Greek settlers of the Decapolis confederacy, the Romans, and, a thousand years after, the Crusaders.

Going into greater topographical detail, the writer describes the Shephelah, or low hill country which borders the territories of Judæa and Samaria on the west. And here he shows that while towards the north the Shephelah merges insensibly into Samarian territory, it is separated from the Judæan plateau by a series of valleys which all contribute to the strategic strength of the frontier. It is true that certain cross-valleys, as Ajalon, run up through the Shephelah into the plateau, to within a short distance of Jerusalem, but they are defensible with comparative ease, and as a rule invaders have not attempted them without first securing other points of vantage outside the plateau.

The enthusiastic interest he feels in the country lends, we think, sometimes too vivid a hue to his landscapes; his account, however, of Samaria and Galilee, of the richness of the scenery, the wealth and variety of incident which crowds its history, the character he draws of the people as contrasted with the Jews, and the extent to which they were affected by Hellenic influences, is as interesting as it is eloquent, and an excellent example of what "historical geography" should be. It is hardly necessary nowadays to point out how much the "Sacred History" gains, how much light is thrown on it, when it is studied on the modern method, and taken in conjunction with, and as an integral part of, the history of the surrounding regions.

We have not space to refer to many other points of interest in the volume, such as the identification of sites, the question of the origin of the Philistines, or the historical influences, Greek, Herodian, and Roman, by which the early Christianity of Palestine was influenced. We can only add that alike for the travelled and untravelled reader many a fruitful train of thought is suggested, and much varied light thrown on the subject by this very able and ingenious presentment of it.

The maps are excellent; only in the general map of Palestine the colouring for the greater altitudes is so dark as to make the smaller letter-press practically illegible. There are a few misspellings of Arabic and other words, and an occasional obscure or inaccurate sentence; these will no doubt be rectified in another edition.

THE EXPLORATION OF ICELAND.

The *Verhandlungen der Gesellschaft für Erdkunde*, No. 5, 1894, include a paper by Dr. O. Cahnheim on the joint journeys in Iceland, made in 1889 and 1892 by himself and Dr. Karl Grossman, whose account appears in the *Geographical Journal* for the same month. Dr. Cahnheim treats of practically the same matters as did Dr. Grossman, and his paper is illustrated by a different selection of photographs; the want of a map, however, makes it somewhat difficult to follow the route.

The same publication contains a translation of a letter from Mr. Thoroddsen, dated Reykjavik, April, 1894, in which are stated the preliminary results of a journey made by the writer last year in the comparatively unknown districts in southern central Iceland, and between that region and the coast. Mr. Thoroddsen, favoured by good weather, extended his travels over nearly the whole of the Vestur-Skaptafellsýsla, between the Vatnajökull and the Mýrdalsjökull, up to the hitherto unvisited sources of the Skaptá and Hverfisfljót. Fairly complete surveys were also made between the Tungná and the great Skaptá; the lava streams sent forth by the elongated crater of Laki in 1783 were measured, and the geological features explored down to the *sandar* or tracts of sand along the coast.

In the Vestur-Skaptafell district the lower beds are exclusively palagonite tufas and breccias of two formations. The older tufa, which is the more widely distributed, is greatly disturbed by innumerable layers of intruded basalt, and upon it the newer lies unconformably in horizontal strata, probably of post-glacial age. In these latter basalt is entirely absent, but here and there beds of conglomerate occur. Between the Tungná and the Skaptá the tufa is greatly eroded, and the appearance of the ranges of hills singularly different from that familiar in other parts of Iceland. Liparite occurs only twice, in Faerines, eastwards from Skeidarárjökull, and in Torfajökull. In the latter it is found in large masses, covering an area of nearly 60 geographical square miles, and underlying the snow-cap of the mountain, which rises to 3300 feet. Three recent (post-glacial) streams of liparite-lavas extend from the hills to the north of Torfajökull, and are noticeable for their surface coverings of obsidian and pumice already described by Mr. Thoroddsen in 1889. Most of the lavas lie just on the limits between Liparite and Trachyte, containing 63 to 69 per cent. of silica.

Pre-glacial dolerite lavas are widely distributed over the highlands to the north of the Sidá district, between the rivers Hverfisfljót and Skaptá, in a manner very similar to the more recent formations, from which they are chiefly distinguished by ice-markings. Mr. Thoroddsen made many observations of the trend of the scratchings, and was led to conclude that the centre of glacial motion was not, as at present, in the Vatnajökull, but that the great ice-stream from the interior, disregarding the smaller inequalities of the land surface, moved downwards across the depression between Mýrdalsjökull and Vatnajökull, and was split by the hills at the base of the former; so that one arm was deflected eastwards towards Sidá, and another towards the southern lowland of the Thjórsá. The littoral between the spurs of Hjörleifshöfdi and Ingólfshöfdi was apparently submerged at the end of the glacial period; it is bordered on the north by rocky cliffs bearing unmistakable traces of the action of the sea.

The Vestur-Skaptafell district is enclosed by the two great snow-fields of Mýrdalsjökull and Vatnajökull, 300 and 2300 square miles in area respectively. Nineteen glaciers have now been traced to the former, while the whole of the western side of the latter feeds one immense ice-stream—the Skaptárjökull—50 miles in length. Swift streams, varying in colour from milk-white to a chocolate brown, issue from all the larger glaciers and carry down large quantities of mud. All along the coast of this region are found expanses of gravel and mud, interspersed with occasional lava beds, and, at a distance from the glacier rivers, isolated patches of vegetation. Cultivation is entirely confined to mountain slopes, beyond the reach of glacier-water. The barren "sandar" cover 560 square miles, whereon are found mud, gravel, beds of scoriæ, and quicksands. Severe floods are not infrequent, caused either by bursting of dams of ice, or by volcanic eruptions under the glaciers. The immense changes produced by the latter agency are perhaps best illustrated in the Mýrdalssandur during eruptions of Katla. On May 11, 1721, so great a mass of glacier ice was suddenly ousted from its position that the sea was covered to a distance of 3 miles from the coast, and the Mýrdalssandur flooded to a depth of 300 feet.

The volcanoes of those regions may be divided into those covered by glacier ice and those exposed to the atmosphere. The former are only accessible immediately after an eruption, and, so far as is known, they never send out streams of lava, only ashes and scoriæ. In the latter the vents are either long fissures, or series of small craters; and these volcanoes have covered an area of about 400 square miles with lava-beds. The most remarkable is the immense fissure stretching in a north-easterly direction, from the Mýrdalsjökull to Mount Gjátindur, a distance of 20 miles, and known as the Eldgjá (fire-chasm). This rift, which averages 400 to 600 feet in depth, has overflowed at three different points, covering with its lava-streams an aggregate of nearly 200 square miles. Mr. Thoroddsen, from a study of existing records, places the date of its formation at about 900 A.D.

Several weeks were spent amongst the craters and lava-streams of Laki, and a special study was made of the great eruption of June to October, 1783. A complete report on the configuration of the district before and after that catastrophe is being published in the "Dansk Geografisk Tidskrift," from which it appears that about 2 cubic miles of lava were poured forth during the five months, and over half a cubic mile of ashes and scoriæ.

We are glad to observe that Mr. Thoroddsen hopes to extend his explorations during the present summer, chiefly in the Auestur-Skaptafell and the eastern part of the glacier-region.

THE MONTHLY RECORD.

THE SOCIETY.

The New Session.—The first meeting of session 1894-5 will be held on Monday, November 12, when Mr. H. H. Johnston, C.B., will give a paper on the British Central Africa Protectorate, copiously illustrated with new photographic slides. The second meeting of the session will probably be devoted to a paper by Mr. Walter B. Harris, on his recent journey to Tafilet, Morocco. As will be seen from the programme issued with this number, several other important papers may be expected during the session. In the same programme will be found some details of the changes which have been made in the Society's premises during the recess, including the introduction of the electric light, large additions to the library and map accommodation, and other improvements which it is believed will add to the efficiency of the Society, and promote the comfort of the increasing number of Fellows who visit the Society's rooms.

The Society's Prizes and Certificates to Training College Candidates.—The following list of candidates for Queen's Scholarships in English Training Colleges, at the examinations of July last, who have been successful in gaining the Society's prizes and certificates, has been forwarded by the Education Department: PRIZES (*Males*)—Frank Ash, Slough Board School; James A. Barker, Hackney Wick, Gainsboro' Road Board School; Robert F. Beck, Douglas, Tynwald Street Board School; Charles William Coney, Wanstead, Downsell Road Board School; Frederick W. Downing, Beccles Board School; Frederick J. Drayton, Ely National Schools; Miles W. Duffill, Hoxton, Wellington Street Board School; William C. Ennis, Hull, Chiltern Street Board School; William A. Hubbuck, Ecclesfield, Wincobank Board School; Frederick M. Reid, Bridport General Boys. (*Females*)—Bessie Abadi, Hatcham, Monsom Road Board School; Maria F. Bollom, Stella, St. Cuthbert's National Schools; Winifred Hindshaw, Pendleton, Broughton Road Board School; Elizabeth D. King, Tynemouth, Western Board Schools; Christina M. McEwen, Rhyl, Christ Church Board School; Mary J. Maher, Poplar, Upper North Street Board Schools; Mary B. Midgley, Keighley, North Village Infant Board Schools; Mary S. Rae, Battersea, Gideon Road Board Schools; Bessie W. Seward, Bridgwater, Girls' and Infants' National Schools; Maud Talbot, Pendleton, St. George's, Wellington Street Board Schools. CERTIFICATES (*Males*)—Charles E. Arnold, New Fletton

Board Schools; Edwin A. Bell, Newbury National Schools; John W. Bryant, Consett Board Schools; Daniell G. Cooke, Bristol Temple, Colston Church Schools; John T. Fletcher, Eckington Board School; William Hackett, Huddersfield, St. Andrew's Church Schools; Edwin A. A. Jones, Maidenhead National Schools; Frederick Pritchard, Loughborough, Cobden Street Board School; Ambrose Trenouth, Devonport, Morice Town Board School; Stephen Wiseman, Escombe Church School. (*Females*)—Margaretta Atkinson, South Shields, St. John's Higher Grade Schools; Emily Chirgwin, Swindon, College Street Board School; Euphemia H. Daniells, Highbury, Gillespie Road Board Schools; Jessie Grime, Manchester, Ducie Avenue Board School; Margaret A. Jacobsen, Liverpool, Pleasant Street Board School; Matilda E. Marshall, South Wimbledon, Trinity; Frances H. Pierrepont, Nottingham, Trinity National School; Florence S. Thomson, Goswell Road, Moreland Street Board School; Stella Westaway, Stoke Damerel Board School; Elsie M. Whitworth, Croydon Board School. The following names have been forwarded by the Scotch Education Department, as those of the candidates for Queen's Scholarships who obtained the highest number of marks for Geography at the examination of July, 1894: *Males*—(1) William A. Edward, Glasgow, Overnewton; (2) James Flett, Drainie, Lossiemouth; (3) Edward Blades, Bathgate, Armadale; (4) John Lardlow, Jedburgh, Grammar School. *Females*—(1) Mary A. McArthur, Govan, Greenhill; (2) Elizabeth Young, Haddington, Premney; (3) Minnie C. Reddock, Fordyce, Portsoy; (4) Joan N. Brown, Edinburgh, Normal F. C.

EUROPE.

The Hegemony of Europe.—In an article contributed to *La Société Nouvelle*, and printed separately in pamphlet form, M. Reclus traces briefly the causes which have given to Europe its present preponderating *rôle* in the advance of civilization, and discusses the question whether the foremost place is likely to be retained in the future. Having noticed the differences in form and relief, which have favoured Europe in contrast to Asia and Africa, the writer points out the special advantages of position, etc., which enabled Greece and Rome in turn to take the lead in the march of progress, and shows how the historic routes between the Mediterranean and North-West Europe (notably that along the valley of the Rhone) helped forward the extension of civilizing influences to the wider world bordering on the ocean, until at the present day the centre of energy, which radiates over the rest of the world, has shifted to England, whose language promises to become the universal medium of communication among the nations. Europe, though she originally received her civilization from the East, has kept the first place for over two thousand years; will she, asks M. Reclus, in her turn be disinherited? To this question he does not hesitate to reply in the negative, pointing out that the movements of civilization do not now follow merely one or more lines of least resistance, but extend their influence from one extremity of the world to the other, the horizon having gradually extended until it embraces the whole of our planet. The industrial competition of the countries which are now participating in the life of Europe, need not be fatal to her, so long as she makes the best use of her own resources.

ASIA.

The Gohna Lake.—The following extract from a letter from Lieutenant Guy Lubbock, R.E., has been kindly forwarded by his father, Mr. F. Lubbock: "Gohna, August 26, 1894.—The great catastrophe is just over; only, unfortunately, it came off between 12 and 2 a.m. last night. The water had just reached the top of the dam at five yesterday morning, and about six, Crookshank cut away a little bank we had made to prevent it overtopping at night, and the water began to trickle over. We watched the overflow getting larger and larger, with great excitement; but for about six or seven hours nothing happened, although the dam had cracked badly on the lower side the day before. At about twelve we thought it prudent to leave the dam, and went to watch from the telegraph-office 1000 feet up the hillside. At about three the transformation scene began. By this time there was a large amount of water both running over and percolating through the dam, and suddenly a huge rent began appearing near the lower end, and slowly extending towards the lake. It was an uncanny sight to see a deep ravine, about 200 feet deep and 400 feet wide, slowly advancing as the earth at the head of it was continually falling in and being carried off by the stream, now growing stronger every hour, as the lake was still rising. We thought the burst was going to happen before our eyes; but at about four o'clock the mist came down, so that we could see nothing more; and I don't think the ravine did go much further that day. It was very annoying, as we were pretty certain it could not last all night. It actually went at about 11.30. However, as it was pitch dark, with a thick mist and rain, I didn't get out of bed. Crookshank went down to the slip; but as the whole thing was cracking and subsiding in the most alarming way, he very soon came back. As far as we could make out, it fell 25 feet in the first hour, and about 300 feet in the next hour, after which it remained stationary, and will remain so. The flood rose 160 feet at a place 20 miles down, and 50 or 60 feet at Srinagur, about 70 miles down. The latter place, the capital of British Garwhal, was quite obliterated. The change in the whole place next morning was wonderful. The cut in the dam was about a mile long, a quarter of a mile broad, and about 320 feet deep in the highest part. The buried village reappeared, covered with about three inches of mud. The hillside that had been under water all began falling in, and what with the dead trees and brown withered grass, the whole place presented a most desolate appearance, 'and smelt so—pah!'"

Mr. Theodore Bent's Expedition to Arabia.—Mr. and Mrs. Theodore Bent will leave England in November to undertake a new expedition in Southern Arabia. They will, on this occasion, start from Muskat (Oman), and make their way across Arabia to Aden. They will again be accompanied by Mr. Imam Sharif, the Indian surveyor, who did such excellent work on the journey to the Hadramut. As Mr. and Mrs. Bent expect to return to England about April, we shall probably be able to have an account of the expedition before the end of the session.

Dr. Sven Hedin in Central Asia.—The last news from Dr. Sven Hedin, received from the Russian military post Pamirski, is, that on September 8 he had returned there from his exploration of the Yashil-kul, and that in a few days he proposed to leave to conclude his exploration of the mountain group Mustagh-ata and its glaciers. During the summer he had explored no less than elev great glaciers of the giant mountain, as well as Lake Yashil-kul, but he propos to stay another six weeks in the same locality for further exploration. He a intended to spend the winter on the banks of Lob-nor, and later, to proceed, Kashgar, to Tibet. The commander of the Pamir post, who forwarded the abo information, adds that on September 6 and 7 they experienced the first snowstorms.

on the Pamirs, and the temperature fell at night to −2° Celsius. The first attempts at sowing barley, radish, and turnips, on the Murghab, 27 miles below the post, at an altitude of 11,500 feet, have proved quite successful. As to wheat, it was not yet ripe, and required a fortnight of bright weather without too strong night frosts.

Colonel Holdich on the Route of Alexander the Great.—In the note on this subject in the October number, p. 360, the following corrections should be made: line 5, *for* Potala *read* Patala; line 10, *for* Luo Bela *read* Lus Bela; line 24, *for* Brahins *read* Brahuis; lines 30 and 31, *for* Arnan *read* Arrian.

Mr. Bent's Expedition to the Hadramut.—Mr. Bent regrets that inadvertently he stated that the naturalist of the expedition was sent out by the British Museum. He was sent out at the sole expense of Dr. J. Anderson, F.R.S.

AFRICA.

Surveys in the Northern Cameroons.—A new survey with watch and compass has lately been made of the route followed by Dr. Zintgraff, between Mundame, on the Mungo river, and the now abandoned station of Baliburg, by the brothers Conrau, of the Cameroons Hinterland commercial expedition. A short account of the route is given in the *Mitt. aus Deutschen Schutzgeb.* (vol. vii. part 2), accompanied by a map and critical note by Dr. R. Kiepert. The present survey is, in his opinion, more reliable than previous sketches have been, one of which, by Ehmann, of Dr. Zintgraff's expedition, he gives side by side with the new map for the sake of comparison. There is a considerable difference in the general direction of the route on the two sketches, Conrau giving it as first northerly, and then, after a sharp bend, almost easterly, while according to Ehmann it is more consistently north-easterly. The position of Baliburg, according to the former, agrees well with that adopted by Kiepert in his German Colonial Atlas, from a combination of Zintgraff's and Flegel's routes, a fact which lends it some support. Conrau also differs from Zintgraff in considering a more northerly stream as the upper course of the Calabar river, that so marked by the latter being considered by the former as a southern tributary, though he allows that the accounts given by the natives may be erroneous, owing to their ignorance of the course of streams where they flow through dense forest. He also gives both streams rather a north-west than a westerly course, though, as Dr. Kiepert remarks, they must soon bend round to the latter direction in order to reach the point attained by Beecroft. The Banyangs stand in trade-relations with the English factories on the Calabar, the Skiahas acting as intermediaries. The water-parting between the Mungo and Calabar rivers seems also a line of separation ethnologically, the palm-mat huts seen south of it giving place to the north to those with clay walls. On the plateaux of the Bali country, which succeed the forest region further south, the climate is healthy, and wheat would probably thrive, but the unhealthiness of the intervening country is a drawback. The potatoes introduced by Dr. Zintgraff are now zealously cultivated by the natives. While in the forest-land the villages are numerous but small, on the plateaux the tribes congregate in single large settlements.

The French Protectorate on the Ivory Coast.—M. Marcel Monnier, who accompanied Captain Binger on his journeys into the interior of the Ivory Coast of Guinea in 1891–1892, after the abortive attempt at a delimitation of the Anglo-French boundary in those regions, gives a general account of the country traversed in the *Annales de Geographie* (1894, p. 409). Although the first French acquisition on this coast was made as far back as 1842, it is only within recent years that any progress has been made with the development of the country, or the exploration of the interior. A new era has lately been inaugurated by the erection of the Ivory Coast into a separate administration with Grand Bassam for its capital. The same system of lagoons, separated from the sea by a narrow bank of shingle thrown up by the Atlantic swell, which characterizes the rest of the coast of Guinea, is met with here also. The passage of the narrow channels by which they communicate with the sea is a matter of great difficulty when the waves are high. Behind the lagoons the primeval forest extends for a distance of 200 to 250 miles into the interior, broken only by the courses of streams, the Komoe, Bandama, etc., which form the only routes, with the exception of narrow rugged footpaths. To the north the forests gradually grow less dense, until the Sudan plateau is reached, having an altitude, according to recent observations, of 1000 to 1300 feet, in the vicinity of Kong (these figures are considerably less than those on Captain Binger's map). Here is an open country, with granitic or other rocks emerging from the surface, dense vegetation being seen only along the courses of streams. Large herds of cattle are met with in the neighbourhood of the villages. The inhabitants of the two regions are as distinct as their surroundings. The passive and superstitious Guinea negro of the forest zone gives place in the plateau region to the Mussulman Mande-Diula from the north, a hardy race of traders and cultivators, with regular towns in which the houses are of masonry, displaying great commercial and industrial activity. Kong is the trade centre of the whole southern Sudan, and contains at least 15,000 inhabitants. A view of the town, from a photograph by M. Monnier, is given with the article, but does not, he says, at all adequately represent the imposing nature of the reality. The inhabitants show none of the usual Mussulman fanaticism, and the writer builds great hopes on the assistance to be obtained from them in the development of the commerce of the country in the interests of the French, to whom they have proved exceedingly friendly. At present few European articles reach Kong, and, contrary to a generally received notion, the velvet, satin, etc., displayed by the mission were then seen for the first time. Some progress has already been made in the way of trade at Grand Bassam, five factories having lately been established, and M. Monnier predicts good results, from the great advantages of situation, etc., possessed by the colony. Besides one attempt at a coffee-plantation, cultivation has hitherto been hardly tried, want of labour being here, as elsewhere, the great obstacle.

The Health of Europeans on Mount Kilimanjaro.—While other recent writers have considered the question of the settlement of the slopes of Kilimanjaro from the point of view of the products likely to repay cultivation, Dr. Brehme, who has held the official position of doctor at the station of Marangu, approaches the subject on the side of the hygienic conditions (*Mitt. aus Deutschen Schutzgeb.* vol. vii. part 2). His remarks refer solely to the zone between 3280 and 7200 feet above the sea (principally on the southern, south-eastern, and south-western slopes), including little beyond the present upper and lower limits of cultivation, for while the general clearing of the forests above would be fraught with grave risks from a climatic point of view, the comparative scarcity of water in the lower bush-steppes makes them unsuitable for settlement on a large scale. Having pointed out the advantages of the zone in question derived from the composition of the soil (a mixture of decomposed volcanic rocks and vegetable mould), the distribution of the rainfall through the year, the abundant supply of streams for irrigation, and the gentle angle of slope, which is, however, sufficient to afford good drainage, the writer discusses first the occurrence of malarial fever in the cultivated zone, and comes to the conclusion, from his own experience both with natives and Europeans, that while endemic cases do undoubtedly occur, they are never of a serious type, and that this disease should here be no obstacle to settlement by Europeans. In by far the greater number of cases the seeds of the malady have been acquired in the swampy districts at the foot of the mountain, the existence of which, and the length of time at present occupied in passing through them, are the greatest obstacles to the development of the mountain slopes by Europeans. From this point of view, if from no other, the construction of a railway is of the utmost importance. Diseases resulting from chill are much more formidable than malaria to the natives of the plains, when they exchange their dry, hot climate for the damp cold of the mountains, but with suitable clothing Europeans need suffer little in this way. Next in importance come diseases of the digestive organs, which also attack the natives more than Europeans, though the latter, it is true, suffer much from dysentery, owing often to the unavoidable use of preserved provisions. It is, therefore, of great importance to consider how a suitable supply of fresh food can be made available. The meat supply will be the greatest difficulty, as there is not a great area of pasture-land on the mountain. The needed vegetable diet will be more easily supplied, though at present there is little variety, and a better bread-material is greatly needed. The uneven ripening is the great obstacle to the cultivation of wheat, necessitating the daily gathering of the ripe ears for about a fortnight. Potatoes can be grown with the best result, and all sorts of garden vegetables. There is no difficulty in finding suitable sites for dwelling-houses, owing to the universally good drainage. Vegetation, however, should be kept under in their vicinity. With the erection of saw-mills, and better means of transport from the coast, the class of houses can be in time improved. It remains to be seen whether the stone houses built at Moshi will stand the test of earthquake shocks. Dr. Brehme considers that colonization by small cultivators is the most likely to prove successful.

A Visit to Lake Mweru.—From the station of Lofoi in the Garenganze country, east of the Lufira, Mr. Crawfurd, one of the missionaries settled there, has made two journeys across the Kundelungu plateau to Lake Mweru and its eastern shores, by routes considerably to the south of those of Sharpe and Stairs. Some details of geographical interest appear in his diary, which has been published in *Echoes of Service*, that dealing with his outward route on the second journey appearing in Part 1 for July of the present year (p. 162). The plateau was climbed at the head of the Kasanga valley, which runs eastwards from that of the Lufira. Near the eastern edge of the plateau, a visit was paid to the rock refugees of the Va-Lamotwa, whose retreat is so carefully concealed among the labyrinth of rocks that, without a clue, it would be impossible to discover it. The descent towards the lake forms two distinct steps, a lower plateau intervening between the highest ground and the level savannah in the neighbourhood of the shores. The latter is inundated during flood season, giving the lake a great extent south-westwards. Crossing the Lufukwe river, which flows to the lake, Mr. Crawfurd traversed the savannah in an easterly direction, and later on a strip of thin forest, reaching the lake apparently near its south-west corner, a line of low hills forming its immediate boundary. The shores appeared more diversified with bays and promontories than is shown on the maps. Boats having been procured from the Va-Shila or lake people, Mr. Crawfurd in two days crossed to the eastern side, skirting the southern shore, and passing the two mouths of the Luapula, the western, which alone bears that name, being found by measurement to be 592 yards wide, while the eastern (called Mifimbo) was treble that amount. (It should be noted that on Sharpe's map given in the *Journal*, vol. i. p. 576, only one mouth is marked, though earlier maps supposed two, divided by Kisi Island). The chief Shimba, on Kilwa Island to the north, has made himself much feared in these parts. East of the Luapula five good-sized islands were passed. The name Mweru, according to Mr. Crawfurd, means "white," while Luapula denotes "great wave-lasher." On the way to the Kalungwizi station on the east shore he struck into the old route of Livingstone, whose map, he says, is thoroughly reliable. The settled government lately introduced seems generally welcomed by the inhabitants.

POLAR REGIONS.

The Peary Polar Expedition.—We learn, from information recently communicated to the *Times*, that the steamer *Falcon*, with the members of Lieutenant Peary's Polar expedition, arrived at St. John's, Newfoundland, on September 15. Lieutenant Peary himself, with two of his men, has remained in Greenland to continue his work of exploration for another year. Mr. Peary landed in Bowdoin Bay, in Inglefield Gulf, 35 miles north of M'Cormick Harbour, in August, 1893. On March 6, 1894, he started on his journey to Independence Bay, with eight men, twelve sledges, and ninety-two dogs. He advanced 134 miles in thirteen days across the inland ice, and an altitude of 5,500 feet was attained. The party met with bad weather almost from the outset; the hardships experienced surpassed all previous Arctic records. With the exception of one, however, all the members of the party escaped injury. The temperature was very low, the average approaching 40 degrees below zero, and the minimum recorded falling to 60 degrees below zero Fahrenheit. These conditions were enormously aggravated by long-continued gales of wind. Owing to the loss of many of the dogs, a section of the expedition was left behind, and Lieutenant Peary with three others pushed on for fourteen days more, but in that time they only succeeded in covering eighty-five miles. In the end the party were compelled to turn back, after making only one-fourth of the distance to Independence Bay. The sledges had to be abandoned, and only twenty-six dogs of the ninety-two returned alive. The head-quarters at Bowdoin Bay were reached on April 18. The rest of the summer was employed in exploring the regions in the nighbourhood of the Bay. The *Falcon*, on its return journey to Bowdoin Bay from St. John's to bring back the members of the expedition, called at Carey Island, in the hope of finding some trace of the Swedish naturalists, Björling and Kalstenius, who were wrecked there in the schooner *Ripple* in 1892, and also carefully examined Clarence Head and Cape Faraday. The search, however, proved without result, and it is consequently regarded as certain that both the explorers are dead. Although having failed in its primary object, the scientific results obtained by Peary's expedition this year are of an important and varied character. A large store of information on the subject of glacial geology has been collected, maps have been drawn up, and the deep-sea fishing from the *Falcon* in Jones's Sound has added greatly to the knowledge already possessed of the Arctic marine fauna. Mr. Astrup surveyed and mapped 150 miles of the shores of Melville Bay, which had hitherto been uncharted. Professor Chamberlin, of Chicago University, who went out this summer in the *Falcon*, carefully studied the seventeen glaciers at Inglefield Gulf and others at Disco, and he considers that the region is an unequalled field for glacial study, because of the variety of glacial forms and the free exposure of structure. Nearly all the Greenland glaciers are tongues from the internal ice-cap, and terminate in vertical faces from 100 feet to 1000 feet high, presenting facilities for investigation which are not found elsewhere. The vertical faces reveal pronounced stratification of the basal ice, even the rocky and earthy materials carried in the bases of the ice being arranged in layers. Fine laminations were seen, twelve or twenty to an inch. The layers are sometimes twisted and contorted, and even thrust over each other. The glacier movement at the ice border varies from a foot per day to a foot per week. The rocks in Inglefield

Gulf are mostly of the Archæan age and crystalline, with dykes of igneous rocks. The most interesting over-ice journeys were made by Lieutenant Peary and his wife, who travelled by sledge to Obrik Bay, and by Messrs. Entrikin and Vincent, who visited Littleton Island in the same manner.

Mr. Trevor-Battye on Kolguef Island.—Mr. Aubyn Trevor-Battye, accompanied by Mr. Hyland, a taxidermist, landed on Kolguef Island at the end of June, in order to spend the summer in studying and collecting the birds of the island. Mr. Powys, with whom they had gone out in the small steam-yacht *Saxon*, went on to Novaya Zemlya for some Arctic shooting, arranging to return to the east coast of Kolguef about the end of July. An accident to the engines necessitated a visit to Archangel, and entailed some delay. Early in August the *Saxon* arrived off the east coast of the island, but was prevented by heavy surf from landing, and proceeded to the more sheltered western side. Here a landing was made, and a letter found from Mr. Trevor-Battye, saying that he would be at Scharsk harbour, on the east coast, at the end of July. Mr. Powys, believing that some other opportunity for leaving the island might have presented itself to Mr. Trevor-Battye and his companion, returned to England. Subsequently Mr. Popham's yacht *Blencathra* went towards the island, but her captain did not consider it prudent to make any attempt to land, and no further news has been received. The Samoyedes who visit Kolguef in summer are in the habit of returning to the mainland in their open boats in September, and it is possible that the two Englishmen have accompanied them to their winter quarters at Pustozerk, on the Pechora. If this be so, some time must necessarily elapse before news can reach Archangel, as travelling in those latitudes is only practicable after sufficient snow has fallen to make sledging possible. Mr. Trevor-Battye's brother, Captain Battye-Trevor, proposes to start a small relief expedition to visit Kolguef and ascertain definitely what has occurred.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Marine Survey of India.—The Administration Report of the Marine Survey of India for the official year 1893–94 records good progress in the work of charting various parts of the coast. At the date of the previous report the survey of the Coromandel coast had been completed as far as Pumair, and was being carried down towards Armeghon shoal. This work was interrupted by the weather, which put a stop to boat-sounding, and the opportunity was taken advantage of to revisit the coast to the northward and fill up gaps in the ship's soundings as far as Chapalmundi. Early in April the *Investigator* returned to Kistnapatam, where the interruption occurred, and completed the survey to Shallingar shoal. It was found that the coast near Kistna, which is composed of sand and fronted by sandhills, gave evidence of considerable changes during each monsoon. On returning to Bombay for recess, the *Investigator* despatched an officer on H.M.S. *Marathon* to survey the Seychelle bank, in connection with the cables which have since been laid between Zanzibar and Seychelles, and Seychelles and Mauritius. Sea-work was begun again in October, with a sketch survey of the Aukretta group of the Laccadives. A detailed survey of the Suheli-Par reef, the most southerly point of the Laccadives, was next made, and a bank with 119 fathoms was found north-east from Minikoi in the direction of a reef reported by the *Noord Braband*. No less depth was observed, and the breakers reported by the *Noord Braband* were probably the tide rips caused by the bank. Between Minikoi and the Maldives soundings were taken 20 miles apart, the depth nowhere exceeding 1100 fathoms, being less than on either side of the line followed. It seems probable that the Maldives and Laccadives are connected by a submarine ridge. The *Investigator* next proceeded to

Colombo, and on the voyage thence to Madras encountered a 4-knot current setting to the southward off the south-east coast of Ceylon. The survey of the Madras coast was then completed with the co-operation of the *Naucowry*, and the two vessels began the survey of Palk Strait at Point Pedro. The scientific work of Surgeon-Naturalist R. Anderson was unfortunately much interrupted by medical duties. It is important to note that the specimens of the bottom brought up on a previous occasion to the west of the Laccadives have not been found to justify the assumption of submarine volcanic action in that region. Opportunity was this year taken to visit as many of the Laccadives as possible, and collections of both shore and reef fauna have been sent to the Calcutta Museum. Dredgings were also made inside the lagoon of the northern Maldive atoll, but with disappointing results. Some interesting notes are given regarding the coral formations on the south side of Palk Strait. The shores are for the most part coral sand, with a fringing reef about 100 yards from high-water mark. A coral cliff 1 to 12 feet high backs the strand at parts of the coast, which Dr. Anderson believes has an origin similar to that assigned by Agassiz to similar cliffs forming the seaward boundary of Florida Keys. The various dredgings made by the *Investigator* in deep water, yielded several new specimens of considerable zoological interest.

The Currents of the Bay of Biscay.—M. Hautreux contributes to No. 14 of the current volume of the *Bulletin de la Société de Géographie Commercial de Bordeaux*, a continuation and completion of his researches on the currents of the Bay of Biscay. The methods employed are those already described in the April number of the *Journal*, but the observations extend over a whole year, from the end of May, 1893. The number of floats thrown overboard during the year was 161, and of these 64 were recovered; the probable courses are plotted on a chart, and compared with what it must be admitted is a somewhat loose-jointed discussion of the winds at Biarritz, Arcachon, and La Coubre. The results, however, show clearly enough that the circulation of the surface water is entirely under the control of the winds. The largest proportion of floats reach the shore during summer, when the winds tend to blow from the sea; and the extra heating of the land in the Landes region exercises so marked an influence on the wind, that nearly everything comes ashore on the Gascon coast, and almost nothing on the coast of Spain or of Brittany. In winter when the winds are off shore, few floating objects reach the land; the tendency is to move eastwards to opposite Arcachon, and thereafter to turn northwards and southwards along the coast, following an indefinite more or less circular course. In no case is there evidence of an oceanic current entering from the open sea. In the centre of the bay the average rate of motion of the bottles was 5 to 6 miles in 24 hours; near the coast the average was only 2 to 3 miles.

GENERAL.

Death of Mr. William Topley, F.R.S.—It is with much regret that we record the death of Mr. William Topley, F.R.S., the Society's instructor in geology. He had been for upwards of thirty years an officer of the Geological Survey. Soon after leaving the Royal School of Mines in 1861, he became attached to the survey, working first among the Cretaceous strata of the south-east of England, and afterwards among the Carboniferous rocks of the Northumberland coal-field. His chief literary work was the well-known monograph on the Weald, published as a survey memoir in 1875. He also contributed many papers of considerable merit to the Geological Society, the Geologist's Association, the Anthropological Institute, and the Society of Arts. Mr. Topley was an authority on water questions and on agricultural geology. When the International Geological Congress met in London in

1888, he was one of the local secretaries, and the last scientific event of his life was a visit to the Zürich meeting of this body at the end of last August. During an excursion to Algiers, immediately after the meeting, he was seized with an attack of gastritis, which, on his return home, proved fatal. Mr. Topley was but fifty-three years of age, and at the time of his death had much scientific work in hand, which it is feared is not sufficiently advanced for publication.

Death of the Rev. J. A. Wylie.—The Rev. J. A. Wylie, of whose brutal murder in Newchang most of our readers have heard, was a promising young missionary, whose interest in travel and geography was shown in the narrative of a journey made by him in Central Manchuria, published in the *Geographical Journal*, vol. ii., 1893, p. 443. His sad death is a loss not only to his church, but to geography.

OBITUARY.

Admiral Sir Edward Inglefield, K.C.B., D.C.L., F.R.S.

Sir Edward Inglefield, whose name stands in the farthest north of our Arctic maps, died on September 5. Whilst his services to Geography in the Arctic regions must always be remembered as his most lasting work, he had a long and distinguished career as a naval officer in active service both before and after his voyages in high latitudes. He was born in 1820 at Cheltenham, his father and his maternal grandfather having both been admirals, and educated at the Royal Naval College, Portsmouth. He took part in the naval operations in the Levant in 1840 and previous years, had some experience of marine surveying in the Malay archipelago, and won his rank as commander by gallant conduct on the coast of South America in 1845. His Arctic experience commenced in 1852 with a private expedition in the yacht *Isabel*, a little vessel of 150 tons, to Smith's Sound and Jones Sound in search of Sir John Franklin. Although his subsequent expeditions were in ships of considerable size, he stated at the meeting of the Society, when Dr. Nansen read a paper on his proposed expedition in the *Fram*, that had he to go out again he would choose the smallest vessel. He reported, as the result of his first expedition, the existence of open water within Smith's Sound. On his return he received the gold medal of the Royal Geographical Society, and became a Fellow. In 1853 he was sent out on board the *Phœnix*, with two other vessels, to the relief of Sir Edward Belcher's expedition in Wellington Channel. In the following year he was sent out again on a similar mission, and brought back the crews of several of the vessels of Belcher's squadron, which were abandoned in the ice. This was the last effort made by the Admiralty in the search for Sir John Franklin. Captain Inglefield passed immediately into active naval service, taking part in the siege of Sebastopol and other operations in the Crimean war. In 1869 he was promoted to flag-rank, and for the next sixteen years he held a series of important commands and appointments. Sir Edward was nominated C.B. (Military Division) in 1869; a Civil Knight in 1877; and K.C.B. in 1887. He was a member of the R.G.S. Council for three years, and to the end took a keen interest in Arctic exploration. He wrote a book entitled 'A Summer Search for Sir John Franklin,' and a number of papers on naval and scientific subjects, and he will be remembered for a number of practical inventions relating to the equipment of war-vessels. He was also an artist of more than average merit.

Sir Edward was twice married.

CORRESPONDENCE.

Ascent of the Takht-i-Suliman.

Camp *viâ* Fort Sandeman, Zhob, Baluchistan, August 8, 1894.

Some remarks which I happened to see a short while ago in one of the monthly magazines on the subject of the Takht-i-Suliman, were calculated to lead one to suppose that the summit of that mountain has never yet been reached by a European. The name of this mountain is so well known from its mythical, geographical, and ethnological associations, that it may interest some of the readers of the *Geographical Journal*, to know that its summit has been reached by Europeans.

This mountain, which, with its sister peak of Kaisaghar, form the highest points of the Suliman range of the north-west frontier of India, is situated in the territory of the Sheranis, who, until brought under British control in the winter of 1890, were an independent and extremely troublesome border tribe. Many legends attach to it. According to some, Noah's Ark alighted here after the Deluge; while others (from this the mountain derives its name) connect it with Solomon, who, as the story goes, once came to Hindostan to marry a lady named Balkis. While returning from India with his bride in a flying throne, the lady requested Solomon to stop for awhile, to enable her to take a last fond look at her native land. Thereupon the throne alighted on this peak, which has ever since borne the name of Takht-i-Suliman, or Solomon's Throne. Ethnologically, the mountain is considered by some to have been the birthplace of the Pushta-speaking races.

From these and other legends connected with this mountain, the shrine situated near its summit has been for many centuries the place of pilgrimage of such adventurous pilgrims, both Hindu and Mohammedan, as were hardy enough to face the dangers of the road, through the wild tribes of the country, and the difficulties of the mountain itself. A native surveyor is said to have reached the shrine about a hundred years ago, while somewhat later two Englishmen, Messrs. Fraser and Harris, members of Elphinstone's Mission of 1809, are said to have attempted the ascent, without success. The military expedition sent to survey this mountain in 1884 succeeded in reaching the summit of the Kaisaghar peak close by, which is 11,300 feet, and some 200 feet higher than the peak of the Takht itself. No attempt was made to scale the Takht, which was said to be inaccessible.

During the Sherani expedition in December, 1890, General Sir George White, the present Commander-in-chief of India, in order to show the Sheranis that even their most remote mountain fastnesses were not inaccessible to British troops, ascended the mountain from the eastern side, accompanied by a small party of picked men, and succeeded, after some two days' hard climbing, in reaching a point on the east line of the hill, but was unable to devote the time necessary for an attempt to reach either the shrine or the actual summit.

Major MacIvor, C.I.E., then political agent at Zhob, and myself determined, the following year, to attempt the ascent, and found ourselves on June 28, 1891, at the Pezai spring, on the western slopes of the range—the highest point at which spring water on that side is obtainable. At dawn on the 29th we commenced the actual ascent, and by the evening, after a hard day's climb, reached the crest-line at the point where the famous shrine is situated. Here we found a couple of rough stone hut shelters erected by pilgrims, in which former visitors had each in turn left cooking-vessels and supplies of flour and rice for the use of them who might come after them. The actual shrine was close by, and within a few yards, but far from a pleasant place to get at. The face of the mountain at this point on the eastern side is a sheer precipice of many thousands of feet. The shrine is some 20 feet down below the edge of the precipice, and consists of a small ledge of rock about 4½ feet long by 3 feet wide, with a slight artificial parapet of rocks on the outer sides, about a foot in height. It is reached by four foot-holes cut or worn away in the rock. The hand and foot-hold is good, but the edge of the precipice appears slightly to overhang the little ledge below, and the sensation therefore experienced in going down or coming up over the edge of the precipice is only equalled by that of seeing some one else do so. All pilgrims apparently do not enter this shrine, but content themselves with looking down into it from above. Those who do descend have a small token in the form of a small piece of stick, which they fix into the interstices of the little rock parapet. Both of us descended, and left our stick tokens. The look down into space from this little ledge does not tempt one to make a very long stay there.

The crest of the mountain at the shrine is not the highest point, which is at one of the three knob-like peaks at the south end of the crest. These we determined to ascend, if possible, next day, notwithstanding the assurances of our native guides that these peaks were quite inaccessible. After a cold night on the crest, on the ground, where some snow was still lying in patches, we commenced a hard day's work. Each of the three peaks before us was separated from the place in which we were and from each other by precipitous gaps in the crest-line, and the ascent certainly did not appear hopeful. Without describing the many adventures of the day, it will suffice to say that we both succeeded in reaching the tops of all three peaks, and also, I am glad to say, in discovering a possible way down again—a matter which at one time appeared somewhat doubtful.

This is the first occasion on which Europeans have reached either the shrine or the summit of the peak of the Takht-i-Suliman. No one has, as far as I know, gone up to either place since.

A. H. McMahon, Captain,
British Joint Commissioner, Afghan-Baluchistan Boundary Commission.

Mr. Seton-Karr on the Position of Mount St. Elias.

The following telegram was published in the *Times* of the issues of September 14 (2nd edit.) and September 15, 1894:—

"Canada-Alaska Boundary Survey have completed their labours. One most important result has been the discovery that Mount Elias, long regarded as the highest peak on the continent, is situated on British territory. The extreme altitude of Mount Elias has been found to be 18,023 feet; but Mount Logan, which is also in British territory, reaches 19,534 feet."

I wish to draw attention to this, as it confirms the position maintained by me in *Proceedings* R.G.S., January, 1887, p. 52, and May, 1887, p. 272; July, 1889, p. 433; November, 1889, p. 684.

H. W. Seton-Karr.

Captain Larsen's Antarctic Journal.

Great Marlow, Bucks, October 11, 1894.

On the translation of Captain Larsen's paper in the *Journal* (p. 333, etc.) on the voyage of the *Jason* to the Antarctic, I venture to send the following few notes:—

P. 333. *Fiskesel.* Should be *-sæl.* This name is not used, so far as I am aware, for any northern species.

Cement, probably "kalk" = lime?

A quarter of a Norwegian mile. A sailor's mile is usually the *sea* mile = 4 English, not the Norwegian land mile = over 7 English.

Petrified worms in *petrified wood.* Perhaps *Teredo?* which would show the wood *had* been "thrown out of water."

P. 335. *Graasel* (= -sæl) is one of the names for the northern Grey Seal (*Halichœrus grypus*).

Blue whale (*Blaathvalen*). Should be *Blaahvale*, Sibbald's Rorqual, or Blue Whale (*Balænoptera Sibbaldi*, Gray).

P. 336. *Finhwale* (should be *Finhvale*) = Finwhales, or *Balœnopteridœ.*

Knarhval = the Humpback (*Megaptera boöps*, Fabr.).

Rethvalen. Should be *Rethvale* = Right Whales (*Balœna*).

P. 338. *Minkeval.* Should be *Minkehvale* = plural. I think this is the lesser Rorqual (*Balœnoptera rostrata*, Fabr.), but forget at this moment for certain. It is either that species or *B. borealis*, Rudolphi's Rorqual.

Kongepenguinerne. Means "the king penguins," which is the English name for *Aptenodytes pennanti*, Gray, but I am not aware that any species is called *Emperor* penguin?

P. 339. *Same species as . . . Graamaage, or Havhest.* Graamaage simply means "grey gulls." Havhest is the Fulmar petrel (*Procellaria glacialis*, L.).

Veier Öen. Should be Vejr Öen.

P. 340. For *Svend Foyn*, see *Zoologist* for 1884, p. 366, and following years.

P. 341. *Kvitting* (*whiting*) = Hvitting, more correctly Hvidling.

P. 342. Skjær = skerries.

Alfred Heneage Cocks.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps—Schwemser-Ferner. *Globus* 66 (1894): 229-233. **Greim.**

Der Ausbruch des Schwemser-Ferners (Oetzthaler-Alpen) am 9 Juli, 1891. Von Dr. G. Greim.

An account and discussion of the bursting of the glacier-lake in the Schnalserthal, with a map and illustration.

Belgium and Holland. **Baedeker.**

Belgium and Holland, including the Grand-Duchy of Luxembourg. Handbook for Travellers. By K. Baedeker. With 13 maps and 21 plans. Eleventh Edition. Leipsic, Karl Baedeker; London, Dulau & Co., 1893. Size 6½ × 4½, pp. lxii. and 423. *Price* 6 *marks. Presented by Messrs. Dulau & Co.*

British Islands—Tide-tables. **Harris.**

Tide-tables for the British and Irish ports for the year 1895. Computed by Captain H. R. Harris, R.N. London. Printed for the Hydrographic Department, Admiralty [1894]. *Price* 1*s.* 6*d. Presented by the Hydrographer.*

England—Derbyshire. **Baddeley.**

Thorough Guide Series. The Peak District of Derbyshire and neighbouring Counties. By Mr. J. B. Baddeley. Ten Maps, General and Sectional (adapted from the Ordnance Survey), by Bartholomew. Sixth Edition. London, Dulau & Co., 1894. Size 6½ × 4½, pp. xxiv. and 158. *Price* 3*s. Presented by the Publishers.*

England—Thames. *Natural Science* 5 (1894): 97–109. **Gregory.**

The Evolution of the Thames. By J. W. Gregory, D.SC.

A criticism of Professor Prestwich's views on the geological history of south-eastern England.

France—Ardennes. *Tour du Monde* 68 (1894): 161–192. **Rayeur.**

A travers l'Ardenne française. Par M. I.-A. Rayeur.

This interesting little paper gives a picturesque account of a trip along the Meuse, contrasting the busy commercial towns and villages which turn the valley of the Meuse into "a street 60 miles long" with the lonely woods of the neighbouring plateau.

France—Landes. *B.S.G. Comm. Bordeaux* 17 (1894): 401–411. **Hautreux.**

Côtes des Landes; vents et courants. Par A. Hautreux.

A continuation of the author's previous researches, which is noticed in the Monthly Record.

France—Lyons. ———

Lyon et la Région lyonnaise. Etudes et Documents publiés à l'occasion du XVe. Congrès des Sociétés Françaises de Géographie, en 1894. Lyon, 1894. Size 10 × 7, pp. lxvi. and 152. *Presented by the Société de Géographie de Lyon.*

This handsome memorial of the meeting of the Congress of French Geographical Societies at Lyons is due to the enterprise of the Geographical Society of that town. It commences with a valuable epitome of the geography of the region, by Professor Gallois, with a map. Then follow special notices of particular subjects, including the history and topography of ancient Lyons by M. A. Bleton, the climate of Lyons by M. Ch. André, and a detailed account by various writers of the agriculture of the department of the Rhone and of the industries of the principal towns of the district, including the manufactures of silk and other textiles, and the special manufactures of Saint-Etienne, Saint-Chaumond, and other towns. Chapters on the systems of communication by water and by rail, and medical and statistical summaries, complete the volume.

Germany—Bavaria. **Günther.**

Glazial- und Drifthypothese auf bayerischem Boden erstanden. Von Siegmund Günther. Separatabd. a. d. Jahresb. d. Geograph. Ges. in München, 1894. Size 9½ × 6½. *Presented by the Author.*

Great Britain. **Baedeker**

Great Britain. Handbook for Travellers. By K. Baedeker. With 16 maps, 30 Plans, and a Panorama. Third Edition. Leipsic, Karl Baedeker; London, Dulau & Co., 1894. Size 6½ × 4½, pp. lxiv. and 547. *Price* 10 *marks. Presented by Messrs. Dulau & Co.*

In the present edition the section devoted to Scotland, although still considerably condensed, has been extended and improved.

Greece. *Z. Ges. Erdk. Berlin* 29 (1894): 260–270. **Galle.**

Dr. A. Philippson's Höhenmessungen in Nord- und Mittel-Griechenland und Türkisch-Epirus im Jahr 1893. Berechnet von A. Galle.

Describes the method of calculating aneroid observations, and gives lists of reduced altitudes for a large number of stations in northern Greece.

Anthropology. **Brinton.**
The Congress of Anthropology. Address by the President. The "Nation" as an Element in Anthropology. By Dr. Daniel G. Brinton. Reprinted from the *Memoirs* of the International Congress of Anthropology. Size 9½ × 6½, pp. 34. *Presented by the Author.*

Architecture. **Fergusson.**
A History of Architecture in all countries, from the earliest times to the present day. By James Fergusson. In Five Volumes. Vols. i. and ii. Third Edition. Edited by R. Phené Spires. London, John Murray, 1893. Size 9½ × 6½, pp. (vol. i.) xxxi. and 634; (vol. ii.) xiv. and 642. *Illustrations. Presented by Messrs. John and Hallam Murray.*

The present edition of this standard work has in part been rewritten in order to make necessary corrections, and the results of recent discoveries incorporated.

Bibliography. **Ellis and Elvey.**
Ellis and Elvey's General Catalogue of Rare Books and Manuscripts. London, 1894. Size 9½ × 6½, pp. 438. *Plates. Presented by the Publishers.*

Bibliography—Oriental. ———
Orientalische Bibliographie begründet von August Müller. . . . Bearbeitet von Dr. Lucian Scherman, herausgegeben von Dr. Ernst Kuhn. VII. Jahrgang. Erstes Halbjahrsheft. Berlin, Reuther und Reichard, 1894. Size 9 × 5½, pp. 157.

Biography. **Lee.**
Dictionary of National Biography. Edited by Sidney Lee. Vol. xxxix. Morehead—Myles. London, Smith, Elder & Co., 1894. Size 10 × 7, pp. vi. and 452. *Price* 15*s.*

The following names, more or less connected with geography and travel, are noticed in this volume: James Justinian Morier, by Stanley Lane-Poole; John Bacon Sawrey Morritt, by W. P. Courtney; Henry Nottidge Moseley, by B. B. Woodward; Joseph Moxon, by Professor J. K. Laughton; Joseph Mullens, by Captain S. P. Oliver; Peter Mundy, by W. P. Courtney; Sir Roderick Impey Murchison, by Professor Bonney; Hugh Murray, by G. Le Grys Norgate; George Chaworth Musters, by the late H. Manners Chichester; and Thomas Myers, by the Rev. J. H. Lupton.

Biography—Brackebusch. *Deutsche Rundschau G.* 17 (4894): 39–41. ———
Dr. Ludwig Brackebusch. *With portrait.*

Biography—Denisot. *Rev. G.* **36** (1894): 193–199. **Marcel.**
Gabriel Marcel: Le conte d'Alsinoys, géographe.

Nicolas Denisot, "conte d'Alsinoys," born in Mans in 1515, was a cartographer and clever designer as well as poet. This notice refers to some of his maps, one of which is reproduced. A separate copy of the memoir has been presented to the Library by the author.

Biography—Eck. **Günther.**
Johann Eck als Geograph, von Seigmund Günther. Forschungen zur Kultur- und Litteraturgeschichte Bayerns. Herausgegeben von Karl von Reinhardstöttner. Munich and Leipzig, G. Franz, 1894. Size 11 × 7½, pp. 24. *Presented by the Author.*

Biography—Khama. **Knight-Bruce.**
The Story of an African Chief: being the life of Khama. By Mrs. Wyndham Knight-Bruce, with a Preface by Edna Lyall. Second Edition. London, Kegan Paul & Co., 1894. Size 6½ × 4½, pp. viii. and 71.

Biography—Middendorf and Schrenk. **Wolkenhauer.**
Deutsche Rundschau G. **16** (1894): 471–474.
Leopold von Schrenck und Alexander von Middendorf. Von W. Wolkenhauer. *With Portraits.*

Biography—Ruspoli. *B.S.G. Italiana* 7 (1894): 308–327. **Keller and Ferrandi.**
Eugenio Ruspoli (1) Rimembranze del prof. dott. C. Keller. (2) Lettera del cap. Ugo Ferrandi al nob. ing. P. Vigoni.

Describing mainly the last journey of Prince Eugenio Ruspoli in Somaliland.

Biography—Uzielli. *Deutsche Rundschau G.* **16** (1894): 470–471. ———
Gustavo Uzielli. *With Portrait.*

Biography—Vespucci. **Markham.**

The Letters of Amerigo Vespucci and other documents illustrative of his career. Translated, with Notes and an Introduction, by Clements R. Markham. London, the Hakluyt Society, 1894. Size 9 × 6, pp. xliv. and 121. *Presented by the Hakluyt Society.*

British Empire. ——

The Year-Book of the Imperial Institute of the United Kingdom, the Colonies, and India, 1894. A Statistical Record of the Resources and Trade of the Colonial and Indian Possessions of the British Empire. Compiled chiefly from official sources. Third Issue. London, John Murray, 1894. Size 10 × 6½, pp. xv. and 888. *Maps, Charts, etc. Presented by the Executive Council of the Imperial Institute.*

In the preparation of this edition care has been taken to obtain official revision of the portions dealing with each colony. The whole work forms a voluminous and authoritative treatise on the commercial geography of the British Empire.

Church Missionary Society. ——

Proceedings of the Church Missionary Society for Africa and the East. Ninty-Fifth Year, 1893-94. London, Church Missionary House, 1894. Size 8½ × 6, pp. (lxxxviii.) 298 and (335). *Maps. Presented by the Church Missionary Society.*

Columbus. **Kayserling.**

Christopher Columbus and the participation of the Jews in the Spanish and Portuguese Discoveries. By Dr. M. Kayserling. Translated from the Author's manuscript . . . by Charles Gross, PH.D. New York, Longmans & Co., 1894. Size 7½ × 5, pp. xv. and 189. *Price 5s. Presented by the Publishers.*

So many phases of the Columbus celebration have been noticed in these pages that we are not surprised now to find a book specially setting forth the services of Jews—who were usually renegades—in the great epoch of fifteenth-century discovery. It is hinted here that America was first sighted by a Jewish sailor whom the admiral cheated of 10,000 maravedis and a silk waistcoat. In any case, the reward paid to Columbus was taken from the confiscated estates of Spanish Jews.

Commercial Geography—Bananas. *Kew B.*, 1894: 229-314. ——

A summary of information relating to "Bananas and Plantains," with descriptions of the species and principal varieties of Musa grown for use and ornament.

It is curious that so important and well-executed a compilation as this should be published anonymously.

Commercial Geography. **Noël.**

Histoire du Commerce du Monde depuis les temps les plus reculés, par Octave Noël. [II.] Depuis les Découvertes Maritimes du XV^{e} Siècle jusqu'à la Révolution de 1789. Paris, E. Plon, Nourrit & Co., 1894. Size 11½ × 8, pp. 446. *Maps and Plates.*

This is the second volume of Professor Noël's great work, and is intended to be followed shortly by a third, bringing the history down to the year 1860. The continuous history of maritime exploration which this volume contains is supplemented by a series of appendices containing translations of original documents. The illustrations, though few, are well chosen.

Division of the World. **Reclus.**

East and West. By Eliséo Reclus. Size 10 × 6½, pp. [14]. From the *Contemporary Review, October*, 1894. *Presented by the Author.*

Early Man. **Piette.**

L'époque éburnéenne et les races humaines de la période glyptique, par Ed. Piette. Saint-Quentin, Charles Poette, 1894. Size 9½ × 6½, pp. 27. *Presented by the Author.*

Educational. **Kirchhoff.**

Erdkunde für Schulen nach den für Preussen gültigen Lehrzielen, von Alfred Kirchhoff. I. Teil: Unterstufe. II. Teil: Mittel- und Oberstufe. Zweite, verbesserte Auflage. Halle a. S., 1894. Size 9 × 6, pp. (I. Teil) iv. and 56, (II. Teil) vii. and 304. *Presented by the Author.*

In this new series of graduated school-books, Professor Kirchhoff succeeds admirably in selecting essential facts for consideration. Even more striking is the manner in which he has dispensed with the use of figures in giving statistics while preserving the conception of proportion and relative magnitudes. This is partly achieved by the use of numerous tables in the form of statistical diagrams, which appeal directly to the eye.

Educational. *Beiträge Methodik Erdk.* 1 (1894): 1–26. **Kirchhoff.**

Zu Professor Hirschfelds Vorschägen über Umgestaltung des erdkundlichen Unterrichts, von Dr. A. Kirchhoff.

Educational. *Beiträge Methodik Erdk.* 1 (1894): 46–156. **Lehmann.**

Zur Beschaffung des heimatskundlichen Unterrichtsmaterials von Dr. Richard Lehmann.

Educational. *Beiträge Methodik Erdk.* 1 (1894): 27–45. **Ule.**

Praktische geographische Uebungen an der Universität, von Dr. W. Ule.

The three papers named above appear in the occasional publication newly established by Dr. Lehmann for the treatment of the educational aspects of geography, and they will be dealt with in another part of the *Journal.*

Educational. ———

California State Series of School Text-Books, Advanced Geography. Compiled under the direction of the State Board of Education. Sacramento [1893]. Size 12½ × 10, pp. 149. *Maps and Illustrations.*

A combined atlas and illustrated geography, treating the world from the Californian centre. Many of the maps are clear but unacknowledged copies of the work of British cartographers.

Educational. *Educational R.* 7 (1894): 310–326; 8 (1894): 5–16. **Montefiore.**

The Fuller Study of Geography. By Arthur Montefiore.

Educational. *J. of Geology* 2 (1894): 66–100. **Davis.**

Physical Geography in the University. By Wm. M. Davis.

This is a paper of exceptional value which will form the subject of a special note.

Educational. ———

The Report of the Commissioners appointed to consider the Draft Charter for the proposed Gresham University in London, together with Dissentient and other Notes. Presented to both Houses of Parliament by Command of her Majesty. London, Eyre and Spottiswoode, 1894. Size 13 × 8½, pp. lxiv. *Price 6d.*

The recognition of Geography in the scheme for a teaching university in London is referred to in the May number, vol. iii. p. 429.

Ethnology. **Brinton.**

Ethnology. On various supposed relations between the American and Asian races. By D. G. Brinton. Size 9½ × 6½, pp. 12. Reprinted from the *Memoirs* of the International Congress of Anthropology. *Presented by the Author.*

French Colonies. **Petit.**

Organisation des Colonies Françaises et des Pays de Protectorat, par Edouard Petit. Préface de M. R. de Moüy. Tome Premier. Organisation politique, administrative et financière, Garde et défense des colonies. Paris, Berger-Levrault & Co., 1894. Size 10 × 6½, pp. xxxi. and 685. *Price 12 fr.*

A full discussion of the methods of French colonial government with regard to their relation to the mother-country and their internal administration in all its ramifications.

French Colonies. **Leseur.**

Publications du journal "Le Siècle." La Situation Coloniale de la France en Juin, 1894. Conférence faite à la Société d' Économie Industrielle et Commerciale le 8 Juin, 1894, par Félix Leseur. Paris, A. Challamel, 1894. Size 7 × 4½, pp. 48. *Presented by the Union Coloniale Française.*

Union Coloniale Française. Rapport de l'Exercice, 1893–1894. Banquet Colonial de 1894. Paris, A. Challamel. Size 9 × 5½, pp. 94.

Publications de l'Union Coloniale Française. No. 3. Avril 1894. Le Régime Commercial des Colonies Françaises. Paris, A. Challamel. Size 8 × 5½, pp. 130.

——— No. 4. Avril 1894. Manuel d'Hygiène Coloniale. Paris, A. Challamel. Size 9 × 5½, pp. 88.

——— No. 5. Juin 1894. Le Soudan Français, organisation et pénétration. Paris, A. Challamel. Size 7½ × 5, pp. 20.

——— No. 6. Juillet 1894. Le Régime Commercial de l'Indo-Chine Française (Annam et Tonkin). Évolution du Régime douanier. Paris, A. Challamel. Size 8 × 5½, pp. 262.

——— No. 7. Aout 1894. Le Port d'Haïphong accessible aux grands navires (Deux projets d'Études). Paris, A. Challamel. Size 8 × 5, pp. 20. *Map*.

Gazetteer. De-Toni.

Repertorium geographico-polyglottum un usum "Sylloges Algarum Omnium," curavit Dr. Hector De-Toni in R. Licæo "M. Foscarini" Venetiarum Scientariam Naturalium Professor. Padua, 1894. Size 10 × 7, pp. 8 and ccxiv.

An alphabetical index of the place-names of all languages, with their Italian and classical equivalents.

General Geography. *Rev. G. Italiana* 1 (1884): 6–32. Marinelli.

Concetto e Limiti della Geografia. Prof. G. Marinelli.

This disquisition on the field of geography was delivered in November, 1892, as the inaugural discourse of the "Cesare Alfieri" Institute of Social Science at Florence.

General Geography. . Haug.

Vergleichende Erdkunde und Alttestamentlich Geographische Weltgeschichte. Von H. Haug. *Text and Maps*. Gotha, *privately published*, 1894. Size 12½ × 10, pp. v. and 71.

This curious work deals with a number of relations which the author points out between the different continents with regard to their form and relief, and it is illustrated by some striking maps.

German Colonies. Meinecke.

Koloniales Jahrbuch. Herausgegeben von Gustav Meinecke. Sechster Jahrgang. Das Jahr, 1893. Berlin, Carl Heymann, 1894 Size 9½ × 6½, pp. 312. Siebentes Jahrgang Heft i–ii. Beitrage, etc., pp. 144.

In addition to full particulars regarding the German colonies, this issue contains papers by F. M. J. Lieben, on the prospects of tropical cultivation in East Africa and New Guinea, by Dr. Hans Schinz on the vegetation of South-West Africa, and on the work of Protestant and Catholic missions in the German protectorates, as well as a number of appropriate notes. The first two parts of the Year-Book for 1894 contain memoirs which will be noticed elsewhere.

Geographical Society of Munich. Günther.

Münchens Geographische Gesellschaft im Lichte der Zeitgeschichte. Von Siegmund Günther. Separatabdruck a.d. Jahresbericht der Geographischen Gesellschaft in München, 1894. Size 9½ × 6½, pp. 22. *Presented by the Author.*

Historical. Gelcich.

Zwei Auszüge aus einer Sammlung von Reise-beschreibungen aus dem XVI. Jahrhundert. Mitgetheilt von E. Gelcich.

Notes of a journey in 1533 from Venice to Constantinople, through Austria and the Balkan peninsula, and of a project for a Suez Canal in 1532, by Giovanni Venetiano, extracted by Herr Gelcich from a rare volume of travels published at Vienna in 1543.

Historical. Green.

Town Life in the Fifteenth Century. By Mrs. J. R. Green. 2 vols. London, Macmillan and Co., 1894. Size 9 × 6, pp. (vol. i.) xvi. and 439; (vol. ii.) vii. and 476. *Price* 32*s*.

This work throws much light on the origin and growth of towns, and is treated with due respect to the underlying geographical conditions.

Historical Maps. *Rev. G. Italiana* 1 (1894): 213–223. **Fiorini.**
Il Mappamondo di Leonardo da Vinci ed altre consimili mappe. Par M. Fiorini, Professore all' universita di Bologna.

Historical Maps. *Rev. G. Italiana* 1 (1894): 341–352. **Casanova.**
Carta nautica del Reinel di proprietà del bar. Giovanni Ricasoli-Firidolfi, descritta ed illustrata da Eugenio Casanova.

A separate copy of this paper has also been received, presented by the Author. It is illustrated by a reproduction of Reinel's chart.

Historical maps. *T.R.G.S. Australasia* (*Victoria*) 11 (1894): 26–40. **Collingridge.**
The fantastic islands of the Indian Ocean and of Australasia in the middle ages, and their significance in connection with the early cartography of Australasia. By George Collingridge. *Illustrations.*

Historical Southern Continent. **Rainaud.**
Le Continent Austral, hypothèses et découvertes, par Armand Rainaud. Paris, Armand Colin & Co., 1893. Size 10 × 6½, pp. 490. *Presented by the Author.*

An interesting historical study, showing the interactions of theory and exploration in the discovery of the geography of the southern hemisphere. The author appears to consider the existence of an Antarctic continent to be a delusion, supposing that only an archipelago lies under the southern ice.

Military Topography. *J.R. United Service I.* 38 (1894): 687–710. **Verner.**
Military Topography. By Major Willoughby Verner, Rifle Brigade. With discussion.

The author gives, as the main essentials of military topography, a study of the tactical value of ground, and the general use of maps. His lecture deals mainly with the conditions of rapid reconnaissance surveys and the use of the range-finder.

Navigation. ———
The International Code of Signals for the use of all nations. American Edition. Revised in the Hydrographic Office. Washington, 1894. Size 10½ × 7. *Plates. Presented by the U.S. Hydrographic Office.*

Orthography. ———
Rules of Orthography for Native Names of Persons and Places. Cairo, War Office Printing Press, 1894. Size 9½ × 6½, pp. 22.

Palestine Exploration. **Whitly.**
Who Originated the Palestine Exploration Fund? By Rev. John Irvine Whitly. [Reprinted from the *Kent Coast Times* of March 29, 1894.] Size 8 × 5½, pp. 8. *Presented by the Author.*

Population of World. *Church Missionary Intelligencer* 45 (1894): 721–730. **Keane.**
The World, population, races, languages, and religion. By Professor A. H. Keane.

This article was prepared a year ago to accompany a new edition of the 'Church Missionary Atlas,' the publication of which has been postponed. The summary according to religion gives roughly 500 million Christians and 1300 million non-Christians.

Sportsman's Handbook. **Ward.**
The Sportsman's Handbook to practical collecting, preserving, and artistic setting-up of Trophies and Specimens, to which is added a synoptical guide to the hunting-grounds of the world. By Rowland Ward. Seventh Edition. London, Rowland Ward & Co., 1894. Size 8 × 5, pp. xii. and 192. *Illustrations. Price* 3*s.* 6*d. Presented by the Publishers.*

This practical guide to the rudiments of taxidermy has proved in previous editions of great value to sportsmen and travellers in teaching them "first aid" in the treatment of skins, which might without it become valueless.

Technogeography. **Mason.**
Technogeography; or, the Relation of the Earth to the Industries of Mankind. By Otis Tufton Mason. From the *American Anthropologist* for April, 1894. Washington, 1894. Size 9½ × 6. *Presented by the Author.*

"By technogeography is meant the study of the relationship between the Earth and human arts and inventions."

Time-Reckoning. *Rev. G. Italiana* 1 (1894): 98–113. **Porro.**
L'Unifacazione dell' Ora. Francesco Porro.

On International time-reckoning.

Topography. **Briant.**

The Art of Topography. By Mr. Rowland Briant. From the *Conference Nr., J. Camera Club* 8 (1894): 82–88.

The author maintains that "the chief essentials of a topographical photograph are that it shall reproduce as accurately and literally as possible the appearance of the locality indicated, exactly as it would impress the sightseer when he has had time to thoroughly look at it; so much being shown as could possibly be seen, so much but no more, the point of view being perfectly practical."

Vespucci. *B.S.R.G. Anvers* 19 (1894): 22–37. **Georlette.**

Améric Vespuce, dans l'histoire et dans la légende, traduction de M. F. A. Georlette.

An abstract of a work by J. M. Pereira da Silva, written in Portuguese and published in Brazil. The fame of Vespucci is shown to be mainly legendary.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

Caucasus. **Radde.**

Karte des nordwestlichen Kaukasus zur Übersicht der Marschrouten Dr. Gustav Radde's im Jahre, 1893. Scale 1 : 2,000,000 or 31 statute miles to an inch. Petermann's 'Geographische Mitteilungen.' Erganzungsheft, No. 112, Taf. 1.—Das gegenwärtige vorkommen des Wisents (Auer) im Kaukasus, 1893. Von Dr. G. Radde. Scale 1 : 600,000 or 9·3 stat. miles to an inch. Petermann's 'Geographische Mitteilungen.' Ergänzungsheft, No. 112, Taf. 2. Justus Perthes, Gotha, 1894. *Presented by the Publisher.*

Denmark. **Danish General Staff.**

Generalstabens topografiske Kaart over Danmark. Scale 1 : 40,000 or 1·5 inch to a stat. mile. Kalkograferet og graveret ved Generalstaben. Kjöbenhavn, 1894. Sheets : Aalborg, Svenstrup, Vestervig. *Presented by the Danish General Staff through H. E. the Danish Minister.*

England and Wales. **Ordnance Survey.**

Publications issued since September 8, 1894.

1-inch :—

ENGLAND AND WALES:—174, hills photozincographed in brown ; 193, 196, 197, engraved in outline; 242, 258, hills engraved, 1*s*. each.

6-inch—County Maps :—

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Town Plans—5-feet scale :—

London (Revision), with houses stippled, VI. 18 ; IX. 39, 2*s*. 6*d*. each.

——— 10-feet scale :—

London—**Re-survey (Hornsey Parish)**, III. 33, 2, 4 ; III. 41, 4 ; III. 43, 2 ; III. 44, 2 ; III. 54, 2 ; III. 64, 1, with houses stippled, 2*s*. 6*d*. each.

——— 10½-feet scale :—

Plymouth and Environs (Revision), CXXIII. 11, 19; CXXXIII. 12, 8. This town is now complete in 79 sheets, 2*s*. 6*d*. each. Index, 6*d*.

(*E. Stanford, Agent.*)

Germany. **Lepsius.**

Geologische Karte des Deutschen Reichs-auf Grund der unter Dr. C. Vogels Redaktion in Justus Perthes Geograph. Anstalt ausgeführten Karte in 27 Blättern berbeitet von Dr. Richard Lepsius. Scale 1 : 500,000 or 7·6 stat. miles to an inch. Lieferung II. Sheets—17, Köln; 23, Stuttgart. Justus Perthes, Gotha, 1894. *Price 3 marks each part.*

Italy. **Instituto geografico militare, Firenze.**

Carta d'Italia. Scales 1 : 25,000 or 2·5 inches to a stat. mile, and 1 : 50,000 or 1·3 inch to a stat. mile. Sheets—54 I., Moncenisio; 54 II., Oulx; 54 III., Bardonecchia; 55 II., N.E., Almese; 55 II., S.E., Giaveno; 55 II., S.O., Coazze; 55 II., N.O., Condove; 55 III., S.E., Roure; 55 III., S.E., Bussoleno; 55 III., S.O., Fenestrelle; 55 III., N.O., Susa; 66 I., Cesana Torinese: 67 I., N.O., Pinasca; 67 I., S.O., S. Secondo Pinerolo; 67 I., S.E., Pinerolo; 67 I., N.E., Cumiana; 67 II., Cavour; 67 III., Monte Viso; 67 IV., Perosa Argentina; 78 I., Monte Chambeyron; 78 II., Argentera; 79 I., Revello; 79 II., Dronero; 79 III., Prazzo; 79 IV., Sampeyre; 90 I., Demonte; 90 II., Madonna Delle Finestre; 90 III., Mollières; 90 IV., Vinadio. Instituto geografico militare, Firenze. *Price 1 li. 50 centimes each sheet.*

ASIA.

Arabia. **Tweedie.**

Map of the Country of the Arabian Horse, 1894. Scale 1 : 4,500,000 or 71·8 stat. miles to an inch. Specially prepared by Major-Gen. Tweedie for his book, 'The Arabian Horse.' W. Blackwood & Sons, Edinburgh.

This is a sketch-map on which the routes of travellers in Arabia, since 1819, are laid down. British consulates, and minor agencies are also shown. The map has been specially prepared by Major-Gen. Tweedie for his work, 'The Arabian Horse,' and the routes by which horses are marched eastward for export are shown.

Indian Government Surveys. **Surveyor-General of India.**

Indian Atlas. Quarter Sheets: No. 12 N.E., parts of Cutch and Kathiawar Agencies (Bombay Presidency); 23 N.E., parts of districts Ahmedabad, Broach, and Surat, and of Native States Bhavnagar, Baroda and Rewa Kantha (Bombay Presidency); 25 S.E., parts of districts Poona, Kolaba, and Ratnagiri, and of Habsan and Bhor States (Bombay Presidency); 90 N.W., parts of district Mandla (Central Provinces), and Rewa (Native State); 105 N.E., parts of districts Palaman, Lohardaga, and Singhbhum, and of Jashpur State (Chota Nagpur), Bengal; 126 N.W., parts of districts Dacca, Mymensingh, Tippera, Sylhet, and Hill Tippera.—Sheets: No. 79, parts of districts Tanjare, Trichinoply, Salem, Coimbatore, Madura, and South Arcot (Madras Presidency), Pondicherry (French territory).—India with additions to railways to 1893, scale 128 miles to an inch.—India, Rice, 64 miles to an inch, 1893.—India, Cotton, 64 miles to an inch, 1893.—India, Sugar-cane, 64 miles to an inch, 1893.—Bengal Survey, 1 inch to a mile, Sheet No. 221, districts Balasore and Cuttack, Killa Kanika and Killa Kujang, Seasons 1888 to 90; 247, districts Cuttack and Balasore (Killa Kanika), Seasons 1888 to 90.—Bombay Survey, 1 inch to 2 miles, half degree, Sheet No. IX., north—Sheets No. 42 and 57 (Rajputana), and 68 and 85 (Bombay). Parts of Sind and of Jodhpore and Palanpur States, Seasons 1878–79 and 90-91.—Upper Burma Survey, 1 inch to a mile, Extract from Sheets No. 260 and 261, city of Mandalay and Environs, Seasons 1886-88 and 1890-91, 2 sheets; 263, district Kyaukse, Season 1889-90.—South-eastern Frontier, 1 inch to 4 miles, No. 1 S.W. (4th edit.), parts of the Chin Hills, of the districts of Upper Chindwin and Pakokku (Upper Burma), of Northern Arakan (Lower Burma), and of districts Chittagong Hill Tracts, South Lushai Hills, and Chittagong (Bengal), Seasons 1853–66, 1871-72, 1888-90, and 1891-92; No. 4 S.E. (4th edit.), part of Northern Shan States, Seasons 1887-1892.—South-eastern Frontier, 1 inch to 8 miles. No. 1 (4th edit.), parts of North Lushai Hills (Assam), of Chin Hills, and the districts of Upper and Lower Chindwin, Katha, Shwebo, Ye-u, Pakokku, Sagaing, and Mandalay (Upper Burma), of Northern Arakan (Lower Burma), and of the districts Chittagong, South Lushai Hills, Chittagong Hill Tracts, and

Hill Tippera (Bengal), 1894.—North-eastern Frontier, 1 inch to 4 miles. No. 23 s.w. (8th edit.), parts of districts Bhamo, Katha, Ruby Mines, and Mongmit (Upper Burma), Seasons 1887–93.—North-eastern Frontier, 1 inch to 8 miles, No. 22 (5th edit.), parts of districts Lakhimpur (Assam), of Singpho-Naga Hills, Hukong Valley, and Bor Hkamti country.—Aden Survey, 1 inch to 4 miles, part of Arabia, Season 1891–92.—Upper Burma, 64 miles to an inch, with additions and corrections to January, 1894.—Bengal, 80 miles to an inch, July, 1888.—Bombay Presidency (exclusive of Sind), 32 miles to an inch, October, 1891.—British Burma, Pegu Division, 1 inch to 4 miles, Sheet No. 1, parts of districts Thayetmyo, Henzada, Tharrawaddy, Bassein, and Arracan, with additions to railways up to 1891; No. 3, districts Toungoo and parts of Prome, Tharrawaddy, Pegu, Thayetmyo, and Henzada, with additions to railways up to 1891.—Map of the Allahabad Division, prepared in accordance with Government N.W.P., P.W. Department, Circular No. E, dated May 16, 1872, revised to April 1, 1892, 1 inch to 4 miles. —District Nadia Presidency Division, Lower Provinces, Bengal, 4 miles to an inch, with additions and corrections up to May, 1892.—District Palamau, Lower Provinces, Bengal, 4 miles to an inch, January, 1894.—District Bhamo, Upper Burma, 8 miles to an inch, December, 1894.—District Kheri, N.W. Provinces and Oudh, 8 miles to an inch, 1894.—District Muzaffarpur, Bengal, 8 miles to an inch, 1890.—District Puri, Bengal, 8 miles to an inch, 1890.—District Lohardaga, Bengal, 16 miles to an inch, 1894.—Index to relative positions of gold-mining and prospecting grants, district Katha, surveyed and demarcated, June, 1893; 2 miles to an inch, January, 1894. *Presented by H.M. Secretary of State for India, through India Office.*

AFRICA.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte topographique de l'Algérie. Scale 1: 50,000 or 1·26 inch to a stat. mile. Service Géographique de l'Armée, Paris. Sheet 92, Le Bon Sellam. *Price* 1 *fr.* 50.

East Africa. **Höhnel.**

Darstellung der hauptsächlichsten Constructions-Elemente für die Karte des nord-östl. Keniagebietes gesammalt während William Astor Chanler's Expedition, 1892–93, von Lieut. von Höhnel. Scale 1: 750,000 or 11·8 stat. miles to an inch. Petermann's 'Geographische Mitteilungen' Jahrgang, 1894, Taf. 14. Justus Perthes, Gotha. *Presented by the Publisher.*

AMERICA.

United States. **Rand, McNally & Co.**

Indexed County and Township Pocket Map and Shippers' guide of—
Arizona, scale 1:1,708,200 or 26·9 stat. miles to an inch.
Colorado, ,, 1:1,014,700 or 15·9 ,, ,, ,,
Idaho, ,, 1:1,660,000 or 26·2 ,, ,, ,,
Rand, McNally & Co., Chicago & New York, 1894. *Price* 25 *cents each. Presented by the Publishers through E. Stanford.*

These are new editions of a series of maps which contain a great deal of information in the accompanying letterpress that will be useful to persons visiting the United States on business or for pleasure.

South America. **Payer.**

Orignalkarte des Rio Napo und Rio Curaray. Nach eigenen Aufnahman in Dampfer "Putomayo," März bis Mai. 1890, Gezeichnet von Richard Payer. Mitglied der wissenschaftl. Komission von Peru (Gesetz v. 4 Nov. 1887). Scale 1: 800,000 or 12·6 stat. miles to an inch. Justus Perthes, Gotha. Petermann's 'Georgr. Mitteilungen.' Jahrgang, 1894, Tafel 13. *Presented by the Publisher.*

AUSTRALASIA.

Queensland and British New Guinea. **Surveyor-General of Queensland.**

Queensland and British New Guinea. Constructed at the Surveyor-General's office, Brisbane, from the most recent surveys and information obtainable, with additions and corrections to 1894. Scale 1 : 1,013,760 or 16 stat. miles to an inch. Printed and published at the Surveyor-General's office, Brisbane, 1894. *Presented by the Surveyor-General of Queensland.*

This is a ten-sheet map of Queensland and New Guinea, in which all the latest material has been used to bring it up to date.

Western Australia. **Calvert.**

Albert F. Calvert's Map of Western Australia, showing the Goldfields. Scale 1 : 6,000,000 or 94·9 stat. miles to an inch. J. J. Bartholomew, Edinburgh, 1894. *Presented by the Author.*

GENERAL.

Ancient Geography. **Kiepert.**

Henrici Kiepert. Formæ Orbis Antiqui. 36 Maps. First Part. Published by Dietrich Reimer (Hoefer and Vohsen), Berlin, 1894. *Price 5s. each part.*

This is the first issue of an atlas of ancient geography which is to be completed in six parts, each containing six maps, accompanied by explanatory letterpress. In the preface Dr. Henry Kiepert gives a historical sketch of the work that has been done in this direction since the middle of the last century, and the principles he has followed in the production of this atlas. The present issue contains the following maps: No. IX., Asia Province; No. XII, Insulæ Maris Ægaei; No. XV., Græcia Septentrionalis; No. XVII., Illyricum et Thracia; No. XXVI., Insulæ Britannicæ; No. XXVII., Hispania. Accompanying the maps is a table which will be found convenient for converting the heights, given in decameters, into English feet. The maps are excellent specimens of cartography, and this atlas bids fair to be of great service to students of historical geography.

German Colonies. **Langhans.**

Deutscher Kolonial-Atlas. 30 Karten mit vielen Hundert Nebenkarten, entworfen, bearbeitet und herausgegeben von Paul Langhans, Siebente Lieferung. Gotha: Justus Perthes, 1894. *Price, 1 mark 60 pf. each part.*

Part VII. contains maps of the distribution of Germans in Europe, with numerous insets, and sheet No. 1 of a four-sheet map of German South-West Africa. This atlas will be completed in fifteen parts, each containing two maps.

The World. **Debes.**

E. Debes' Neuer Handatlas über alle Teile der Erde in 59 Haupt-und weit über 100 Nebenkarten, mit alphabetischen Namenverzeichnissen. Ausgeführt in der geographischen Anstalt der Verlagshandlung. Leipzig: H. Wagner and E. Debes. Parts 5, 6, 7, 8, 9, and 10. *Price, 1·80 marks each. Presented by the Publishers.*

Part V. contains maps of Belgium, Holland, France, and Northern Asia. Part VI., maps of the German Empire, Bohemia, Moravia, and Silesia, and the United States. Part VII., maps of North Germany, the British Isles, and Palestine. Part VIII., maps of North-West Germany, South Asia, and Central South America. Part IX., a commercial map of the World, on Mercator's projection, on which the positions and extent of all colonies are shown as well as the tracks followed by steamers. There are insets illustrating the results of missionary efforts up to 1880, the postal and telegraph systems of the World, and the means of communication by railways, roads, rivers, etc.; and maps of the eastern portion of the Alps, and European Russia. Part X., a language and ethnographical map of Europe, and maps of Denmark, Scandinavia, Australasia, and Polynesia.

In addition to the principal maps, there are numerous insets and full explanations of the symbols and colours employed. The manner in which the maps have been produced leaves nothing to be desired, and each is accompanied by an index.

The World. **Vidal-Lablache.**

Atlas général Vidal-Lablache. Histoire et Geographie. Index alphabétique de plus de 40,000 noms. Paris: Armand, Colin & C^{ie}, Editeurs. *Price 2 fr.*

With the issue of the present part, which contains the index, this useful general atlas is complete. There are 137 principal maps, and 248 diagrams and insets. Fifty-two of these are devoted to historical geography, and every map in the atlas is accompanied by useful notes. They are all drawn in a clear style, and overcrowding with place-names has been avoided. Taken as a whole, it is a very useful atlas for general reference and educational purposes.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published at the Hydrographic Department, Admiralty, July and August, 1894. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
1974 m =	1·4	Norway, south-coast:—Jœlöen to Christiania, and including Drams Fiord. 2*s.* 6*d.*
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981		Seinavina Islands:—Plan added, Port Santiago.

J. C. Potter, agent.

Charts Cancelled.

No.	Cancelled by	No.
2330 Plan of Christiania-fiord on this sheet.	New Chart. Joelöen to Christiania	1974.
2605 France, south coast, Sheet III. 2606 France, south coast, Sheet IV.	New Chart. Cette to Marseille	1805
1692 Plan of Mazari bay on this sheet.		
2762 Plans of Fumboni bays and road, Johanna road, and Pomony harbour on this sheet.	New Plan. Anchorages in Comoro islands	2066
8D Plan of Village bay on this sheet.	New Plan on Chart	8D
264 Kin Hon or Thi-nai harbour.	New Plan. Kin Hon or Thi-nai harbour on new Chart	264
2405 Plan of Little Kuril strait on this sheet.		
1378 Honolulu harbour.	New Plan. Honolulu harbour	1378

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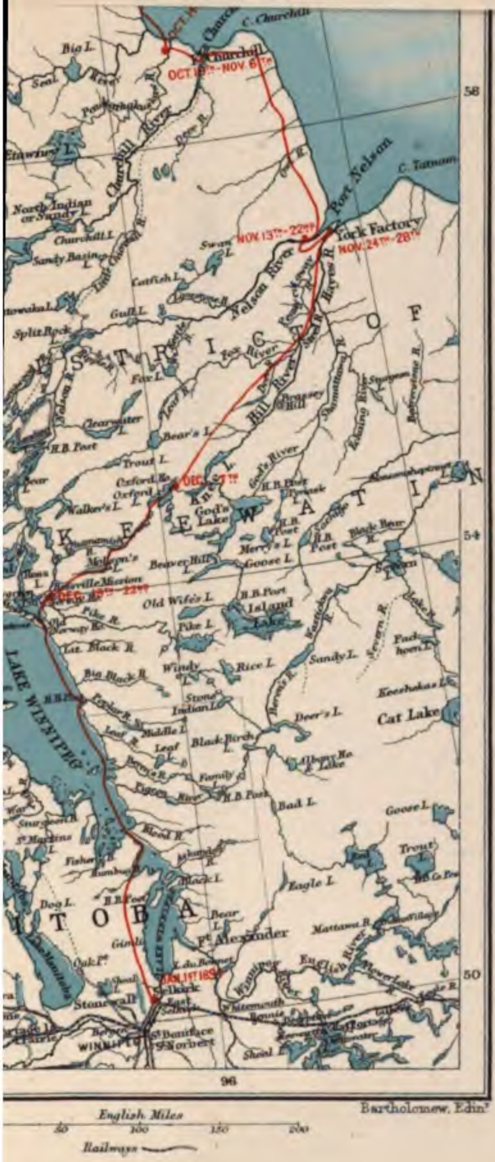
C. Churchill
Churchill
OCT. 19TH-NOV. 6TH
Big L.
Seal R.
Churchill River
Deer R.
North Indian or Sandy L.
Churchill L.
Sandy Basin L.
Port Nelson
C. Tatnam
York Factory
NOV. 24TH-28TH
NOV. 13TH-22ND
Swan L.
Catfish L.
Nelson River
Hayes R.
Gull L.
Split Rock
D I S T R I C T   O F
Fox River
Fox L.
Hill River
Steel R.
Shamattawa R.
Severn R.
Clearwater L.
Bear's L.
H.B. Post
Trout L.
Oxford Ho.
Oxford L.
DEC. 7TH
Knee L.
God's Lake
God's River
Walker's L.
K E E W A T I N
Beaver Hill L.
Merry's L.
Goose L.
Black Bear R.
McLaren's L.
Beaverville Mission
DEC. 19TH-22ND
Old Wife's L.
Pike R.
Norway Ho.
H.B. Post
Island Lake
Pike L.
Lit. Black R.
Big Black R.
Windy L.
Rice L.
Sandy L.
Severn R.
LAKE WINNIPEG
H.B.P.
Poplar R.
Stone Indian L.
Deer's L.
Cat Lake
Middle L.
Leaf R.
Black Birch L.
Albany Ho.
Family L.
Pigeon River
H.B. Post
Bad L.
Goose L.
Sturgeon R.
St. Martins L.
Blood R.
Trout L.
Fisher B.
Eagle L.
Black L.
M A N I T O B A
Dog L.
H.B. Post
Bear L.
Ft. Alexander
Mattawa R.
Gimli
English River
Oak Pt.
L. du Bonnet
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Selkirk
East Selkirk
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Whitemouth
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Geographical Journal.

No. 6. DECEMBER, 1894. Vol. IV.

THE BAKHTIARI MOUNTAINS AND UPPER ELAM.*

By LIEUT.-COLONEL H. A. SAWYER.

The ground travelled over has an area of 15,000 square miles, the principal portion being the hitherto unexplored highlands, known, when seen from a distance, as the "Bakhtiari Hills." The Bakhtiaris and the Lurs, being mostly nomads (that is, if such a term can apply to peoples who have permanent residences for both summer and winter), may be met with during the winter months in certain villages and encampments in the lowland portions of those provinces of Persia (neighbouring these hills to the north and south) which centuries ago were wrested from the once mighty Lur chiefs. But these Bakhtiaris and Lurs, dwellers on the banks of the lower Karun, the Kahkaha, and the Diz stream, are, as far as the province is concerned, even now more like foreigners, whose individual possessions are recognized by the Persian officers. Much about them has been recorded, from the days of Rawlinson downwards, but their own peculiar homes among the mountain fastnesses have till lately been shrouded in a kind of mystery. These mountains have now been ascended, and their valleys traversed in all directions. Thoroughly surveyed on a scale of 8 miles to the inch, nearly every tribe visited in their own encampment, everything appertaining to the Bakhtiaris may now be said to be known.

This country is practically the continuation of the classic Zagros range running in the normal direction of all south-west Persian mountains north-west and south-east; and as the country of the summer homes of the Bakhtiaris (who invariably speak of it as their real and permanent home), it is taken to commence at the Khana Mirza (the home of Mirza, the chief of Janikis) to Khuramabad and Burujird, 300 miles, the same distance as from London to Carlisle. The country is remarkable in so far as it differs materially from that possessing ordinary Persian geographical characteristics. It is also hydrographically of peculiar interest.

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* Read at the Royal Geographical Society, May 7, 1894. Map, p. 584.

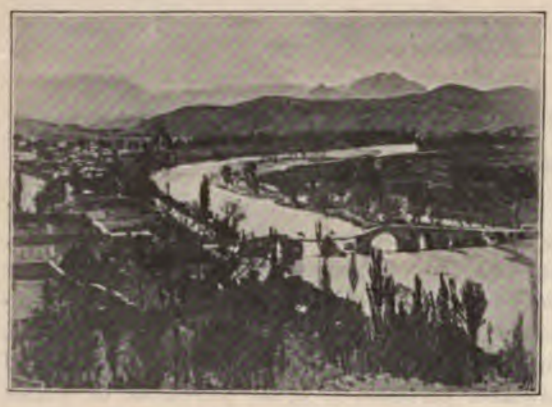

FIG. 1.—FIRST VIEW OF BAKHTIARI LAND.

The mountain ranges, as a system, run parallel to each other as a rule. The "highlands," however, may be said to be limited to the slopes and valleys forming part of the two main and highest ranges. As such these are nameless. Here, as in most savage countries, mountains, rivers, and valleys are known only by local names, covering frequently but a few miles; and, especially where tribes live, and have lived for centuries, without daring to venture from one valley to another, it is not seldom found that the same high snow-clad range bears one name if viewed from one side, and another name if viewed from the other. To describe a country under such conditions, descriptive names must be adopted. These two ranges, then, forming the backbone of the country surveyed, and being its most important features seen from all sides, ruling the water-courses and lines of communication, will be referred to henceforth as the "Outer" and "Inner" ranges; the Outer being the one nearest the interior of Persia; the Inner range the one nearer the seaboard. Though frequently cleft though at right angles by passable and impassable drifts or *tangis*, these ranges may be said to be continuous, and can be traced through the whole country surveyed. Between these lie the high valleys in which are chiefly to be found the homes of the Bakhtiaris and Lurs. On the map will be seen a freehand cross-section from the Persian Gulf to the Iranian plateau. In a general way it purports to show the several parallel ranges, rising step-like to the two highest ranges, which average between 12,000 and 13,000 feet each, and the valley between 7000 to 8000 feet. The space they enclose measures from 10 to 30 miles in width.

In about the centre of the whole country surveyed, the map will show a remarkable configuration lying between these two ranges, almost uniting them at this place. This is Kuh-i-Rang mountain. The Kuh-i-

Rang (lit. "the variegated mountain") also bears the name of Jaihun (lit. "the world's"), and that deservedly; for out of its sides, and within a few miles of each other, jut out the springs of three of Persia's most important rivers. To the east flows the Zainderud towards Isfahan; to the south, the Karun; to the west, what is called locally the Ab-i-Diz, flowing to Dizful.

The Kuh-i-Rang, the highest peak of which is 12,800 feet, is one of the highest peaks in South-West Persia. It is the centre from which all the spurs trend along the usual course north-west to south-east, having gentle slopes and far-reaching limbs to the south-east, and short spurs with abrupt, rocky, and deeply gutted ravines to the north-west. But this normal trend is in a remarkable manner cross-cut by a water-system, of which the Gokun river, running north-east to south-west, is a part, at an altitude of 6000 feet below the Kuh-i-Rang peaks.

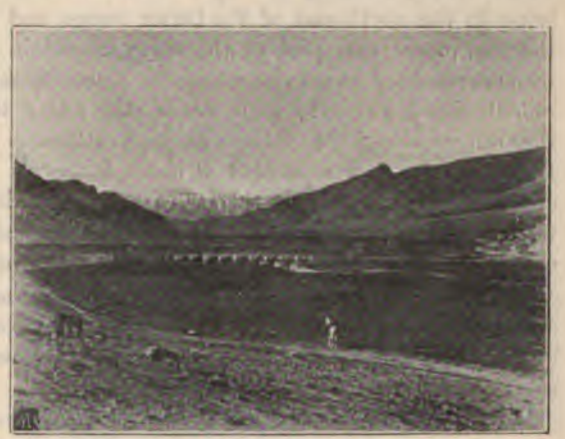

FIG. 2.—THE SHAMSABAD DEFILE.

These Kuh-i-Rang peaks, five in number, are united together by round-topped watersheds, have an abundance of spare water, fuel and fodder, and afford a magnificent view in every direction. Being a central point from which numerous excursions can be made among snow-fields or sunny watercourses, according to fancy, accessible almost to the top by wheels from Isfahan, they may some day, when the means of travelling through Persia have been facilitated, become a favourite resort for the intelligent globe-trotter, who delights in visiting beauties and anomalies formed by contortions of nature. This Kuh-i-Rang, moreover, is a cardinal point in the matter of mountain ranges. It not only, with its several peaks, forms the most elevated group—just under 13,000 feet—but it stands there in its massiveness, demarcating two perfectly distinct systems of drainage, and, as is frequently the case, coincidently forming the boundary of two ethnographical areas. For convenience sake the territorial divisions thus made by the Kuh-i-Rang will be named the Bakhtiari country and Upper Elam, the former lying to the south-east, and the latter to the north-west of this dividing mountain knot.

From here towards the south-east the valleys run parallel to the ranges, which are only occasionally cleft through. For instance, the Outer range is pierced through at the Tang-i-Gezi, making a rift for the accommodation of the Zainderud, and once again at the Tang-i-Darkash Warkash; the Inner by the Karun below the Tang-i-Dopolun. The bottoms of these long valleys remain at fairly constant elevations, and carry the main drainage, giving easy gradients for the main tracks, which generally follow the banks of the river. To the north-west of the Kuh-i-Rang, on the other hand, a most peculiar change is seen. The rivers forming the main drainage, instead of running parallel to the main ranges, now systematically cross-cuts them, the normal north-east by south-west drainage and valleys being cut up into short reaches. These rivers, draining as they do those districts of South-West Persia lying to the north-east of the Outer range, and requiring an outlet to the sea, pierce this part of the main mountain ranges at right angles by several deep channels, which in places form sheer precipices 4000 to 5000 feet high. The main roads still follow the general direction of the ranges along the valleys at high altitudes of 6000 to 7000 feet. But these are now separated at short intervals by deep watercourses and large rivers, rushing through magnificent rifts and gorges, necessitating descents and ascents of many thousand feet, a disagreeable contrast to the travellers' experiences on the other side of the Kuh-i-Rang. But few such travellers exist. Seldom, and then only in parties and well armed, do the natives pass from one side of this variegated mountain to the other. This change of character is illustrated by the smaller sectional sketch on the map.

The map which accompanies the paper shows at a glance the lie of the main ranges, the principal gaps, and the chief watercourses.

The mountain ranges belong principally to the recent formation. Here and there granite and igneous rocks crop up, and in several places evidences of recent volcanic action are visible. One valley, especially well watered, with plenty of flat spaces for cultivation, near which are the remains of ancient (Armenian) stone villages, is now deserted on account of the earthquakes that happen frequently, and the effects of which are seen by the masses of huge rock sprinkling the lower spurs of the Shutrun Kuh. Near its centre is a small lake (Lake Irene), touching the north-west end of which is a small volcano to all appearances of but recent extinction.

The outer covering of the hills forming these ranges is also most marked and remarkable. In general terms it may be said that the ridge crest of the Outer range from near the lake Irene to lake Chigakhor forms a definite line of demarcation. The outer slopes of this range, with the countries at its foot towards Persia, have the ordinary barren, treeless, waterless, grassless, soft moulded, but corrugated, characteristics of normal Persia. From the same waterparting to the southern slopes of the Inner range is seen ruggedness, grandeur, forest, water, and grass in abundance. In fact, the strip from the Parwiz hill to the Sabz-Kuh, made up of the inner slopes of the Outer range, the valleys between the two main ranges, and both the slopes of the Inner range, forms a country totally different in aspect and climate to the plateaux and level plains out of which it has been originally heaved up. It is as fair a country as can be obtained in these latitudes.

Besides the Kuh-i-Rang, there are a few other mountains that deserve a word or two of special introduction. The "Zard-Kuh," really Sard-Kuh ("the Cold Mountain," as the name implies), is covered with snow (on the north side) till late in the year. By the end of July, however, on all these hills the snow lies but in patches, and probably has dwindled away before the new fall, except in the highest sunless gorges and cracks. The Zard-Kuh, a long narrow range, is exceedingly rugged and abrupt (a cretaceous outcrop on a very large scale) on both sides, nearly without any vegetation. Some of its peaks reach 13,000 feet. Next to it, to the south-east, is the Isbiana range, rather out of dressing, having more of an easterly direction. It is really more of a large spur, 20 miles long, is narrow, rugged, and bare on all sides. The next section of the Inner range is the Kuh-i-Gerra. This differs from the other two somewhat, being more rounded on the crest-line. It has a large double peak (one a cone) in the middle of its length, and its lower slopes are a favourite resort on account of its pasturage. Its altitude may be also just 13,000 feet.

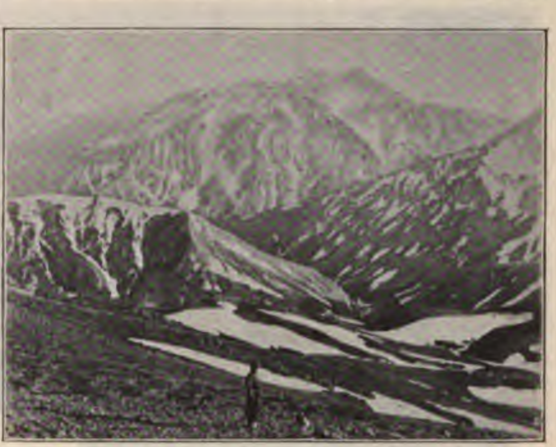

FIG. 3.—VIEW OF THE ZARD RANGE.

The trace of the Inner range now crosses the Kurang river, and continues along the double range of the Sabz-Kuh (Green range) and the Kuh-i-Kallar, which are united at their eastern ends. The former has on its higher slopes the best pasturage in the country. Its end is marked by a conspicuous peak, a notable landmark named Sultan Ibrahim, just over 12,000 feet. The Kuh-i-Kallar is a few hundred feet higher, and of a more rugged and barren character, especially on its southern face. The report of coal being found here is doubted, as several of the peaks climbed showed no signs of any.

To the west of the Kuh-i-Rang, we find in the Outer range the

Kuh-i-Shahan ("the Mountain of Kings"), and a magnificent range it is, with an almost perpendicular drop of 3000 feet to the north. It is traditionally a resort of the pasang (? a small ibex), and its crest, close to its summit of 12,800 feet, reached by a made bridle-path, along which the most nervous and lazy royal sportsman can ride without risk. The next range of note is the Kala Kuh, conspicuous by its erect and rugged peaks, the highest peaks visited being 13,000 feet. The Kala Kuh is to Upper Elam what the Kuh-i-Rang is to the Bakhtiari country. It is a main tap for many mountain springs, and its well-nurtured but rugged spurs afford favourite camping-grounds. The next range is the already-mentioned Shutrun Kuh (lit. "Camel Mountain," from its shape). It too is grand in its ruggedness on the southern side. The last mountain requiring special mention is the "Parwez." It has a large, fairly level summit, with snow springs till July, elevation about 11,000 feet. It is conspicuous from the northern lowlands of Burujird and Silakhor, for it stands out as the end of the Outer range, having a perpendicular scarp from its summit to the Bahrain gap of 5,000 feet.

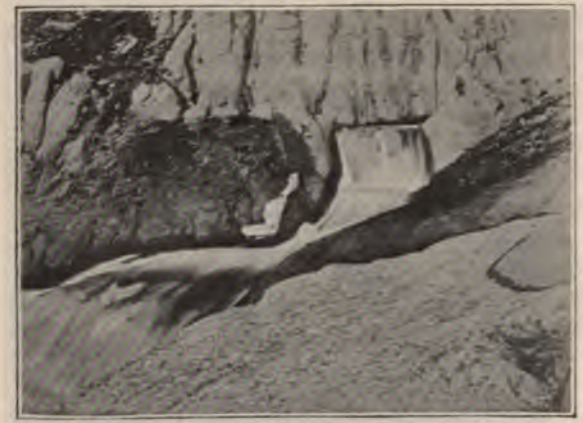
FIG. 4.—THE SOURCE OF THE KARUN.

As already noticed, from out of the Kuh-i-Rang and its vicinity flows abundance of water. Present local nomenclature to the contrary, this mountain holds the sources of the Karun. Though this stream is locally known as the "Kurang," short for Kuh-i-Rang, the local savage perversity gives the name of Sar-i-Chasma-i-Kurang (lit. "the head source of the Karun") to a fountain spring jutting out of the side of the Zard-Kuh, some 10 miles down the valley. There are many such fountain springs in the Bakhtiari country. A continuous flow of water, with sections reaching 150 square feet, is frequently met with, gushing out of a smooth rock mountain side with torrent rapidity, having all the year round the same velocity and quantity. Occasionally such springs are intermittent, the rest periods varying from two hours to two days. The south side of the Parwiz hill contains one such, high up the perpendicular side, 3000 feet above the valley.

Owing to such springs (*e.g.*, the Marbarra, 20 miles below the Sar-i-Chasma), the Karun, even in its upper course, becomes almost at once a formidable river—that is, a fast-flowing stream, from 50 to 100 yards wide, and seldom fordable except in the driest of weather, and that only above the Sar Chashma, its reputed source. Its banks, moreover, are always steep and deep, and in places for long reaches it flows between precipitous, almost perpendicular, banks of 1000 to 3000 feet high. Its waters are therefore still useless for irrigation, but many of its tributaries are fully made use of in this respect. The velocity of its ceaseless flow, however, makes its potential water-power of great value, when the inhabitants of its banks and valleys become sufficiently alive to it. Greater savages than the Bakhtiaris, such as out-of-the-way Burmans (to wit, in Wuntho and on the Upper Mu), would have made use of this power ere now.

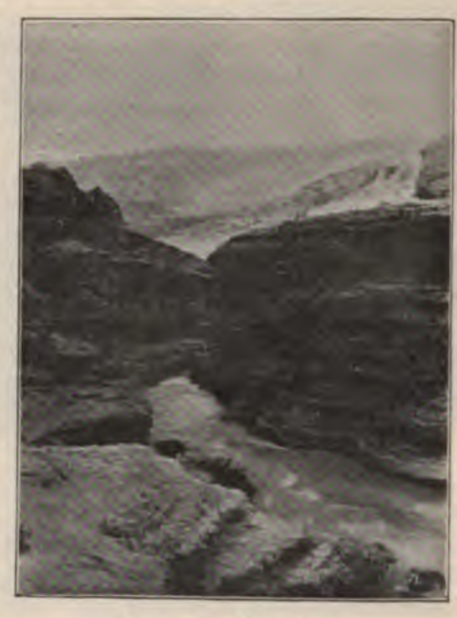

FIG. 5.—THE KARUN RIVER.

The course of the Kurang is a peculiar one dictated by the mountain formation. From its source it flows due south-east for 100 miles; then with a sharp, almost acute bend it flows south-west through the Inner range, and several lesser ranges parallel to it, for 50 miles; then, bending sharply again, it flows north-west towards Shuster for another 100 miles in exactly the opposite direction to its first 100 miles. From Shuster to the Kuh-i-Rang in a direct line is 75 miles, to reach which the river flows 250 miles, with an aggregate fall of 9000 feet, or $\frac{1}{146}$. It is probably the most winding stream in the world after the Orinoco.

The Kurang has, in the Bakhtiari country, three important tributaries running parallel to the parent stream, and no more than from 15 to 20 miles from it. On the southern slope of the Inner range flows the Ab-i-Bazuft in a perfectly straight course for 100 miles. It is like the Upper Kurang, a magnificent stream with a kind of green-blue water (due to the chalk it contains), flowing ever full in deep-set banks through a long well-wooded valley. It is fed by many mountain-side rock springs of fresh water, as also by several large springs and streams of pure salt water—so salt that the neighbouring trees and vegetation, though green, are encrusted with a white saline deposit. In the centre of its course lies the Kala Bazuft, a ruined square serai fort of ancient reputation. The next tributary in importance is what may be called, for want of any general name, the Ab-i-Chigakhor, as peculiar for its winding as the Bazuft stream is exceptional for its straightness. As the name indicates, this tributary commences as the outflow of the Chigakhor basin, and on a smaller scale imitates the course of the Kurang as above described. From the Chigakhor lake to where it joins the Kurang is 20 miles; the stream makes 90 of it. This stream may be said to be the boundary of the Bakhtiari country to the south-east, laving, as it does, the outer slopes of the Kuh-i-Kallar and Sabz-Kuh. Enclosed by these hills is a straight, smaller, but important tributary flowing between them. It is important as watering parts of the country which are in summer thickly populated by some of the best of the Bakhtiari tribes. It is named the Ab-i-Sabz-Kuh.

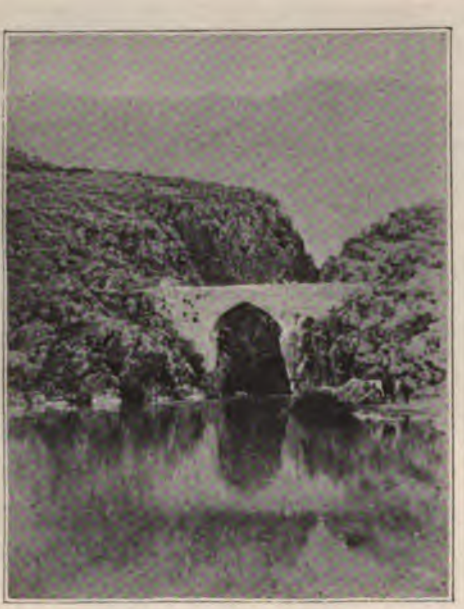

FIG. 6.—BRIDGE OVER DARKASH WARKASH.

The next tributary of importance is the water-system, bearing different names, which unitedly forces its way through a narrow rift, the tang-i-Darkash Warkash, 4 miles above Ardal. Through this tangi, and under the bridge at its mouth, flows a drainage of 2500 square miles. This water-system is the mainstay and the cause of the fertility of three of the districts of the Chhar Mahal (four districts), now politically a portion of the Bakhtiari country, though geographically only so as an outlying part. The short valley which the Darkash Warkash makes across the main Kaj valley is, in consequence of its many advantages (water and shelter from winter winds), deemed one of the fairest spots in the Bakhtiari country, and hence called Bihishtabad ("mansions of heaven").

Of the smaller tributaries, two deserve special notice: one joins the Kurang just above Dopolun ("two bridges"), in the middle of what is known as the Tang-i-Ardal, a long deep winding gorge 1000 to 2000 feet, by which the main stream has worked a way for itself through the Inner range, and is called the Dinaran, or the Ab-i-Gurab, as it rises in a beautiful summer valley of that name at an elevation of 7000 feet. This stream flows first as a sluggish English meadow stream through a valley which in early spring is one bed of flowers and grass, and, leaving it through a small tangi, flows at the foot of the lofty Gerra range in a deep impassable ravine bed, copiously increased by many rock springs and mountain torrents. There are indications that centuries ago the mountain-locked and well-watered "Gurab" valley must have been as favourite a haunt for man as it is now.

On the other side of the Kuh-i-Isbiana (the mountain spur, bearing several names, which separates the Dinaran from the Kurang) is the second smaller tributary worthy of note; it is the Ab-i-Cherri. Though short, it is the outflow of many rock springs, and along its right bank is one of the most ancient high-roads of the world. It is a pretty stream, flowing in a wooded valley, every flat square yard of which bears signs of cultivation.

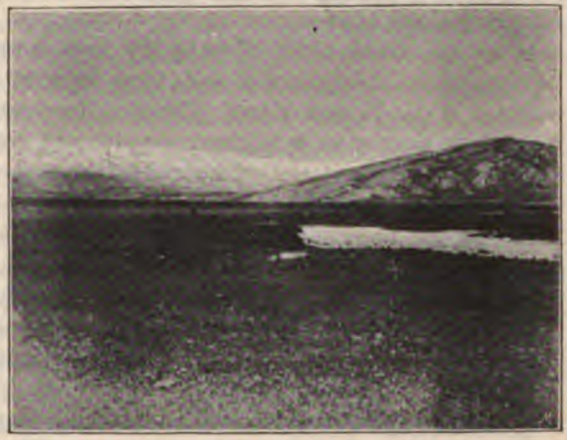

FIG. 7.—ABI-I-ZARIN.

The Bakhtiari country proper may, then, be said to consist of the valleys of the Upper Kurang and its tributaries. For it contains no other water-system except, in a very small area, the head-waters of the Zainderud. These, however, are worthy of special notice, as they exemplify a curious anomaly. The head-waters of this beloved Zainderud,* fertilizing some of Persia's most wealthy provinces, are contained between the Outer and Inner range at the southern slopes of the Kuh-i-Rang. Not content with what the slopes of this mountain give, there seems to be here, within the radius of a few miles (8 or 9), a sponge-like capacity for containing much water. The small pretty valleys of the Zarin ("the golden"), Dima, Kurba, all contain large gushing springs pouring out of the hillsides. These waters unite and rush through the Outer range by the Tang-i-Gezi (not Ghazi) into Persia proper through the province of Faraidan (vulg. Faridun). The waters are all sweet, the valleys are fair, and yet is this head-water basin called Shorab (lit. "bitter"); for in its very centre, equidistant from the other main springs, is a large salt spring at the foot of low salt hills, with streamlets of a saturated saline solution flowing beautifully over large and small crystals. This freak of nature is the converse of what is found at Bahrein,* where a fresh-water spring bubbles up out of the salt sea, enabling men-of-war to fill their water-tanks by merely dropping the hose overboard and pumping. The Bakhtiari country is everywhere well supplied with salt, liquid and solid.

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* May not the real word be Zarin-rud, the "golden stream," from one of its main springs in the Zarin valley?

Separating the bed of the Kurang from this Shorab valley is only a low but long spur of the Kuh-i-Rang, very low and narrow, yet bearing the historic name of Kar Kanan. At a point where the real Kurang is fortified by the Sar-i-Chashma spring and all its head-waters from the Kuh-i-Rang, and where it is already a formidable stream, a work has years ago been commenced with the intention of diverting these head-waters of the Kurang into the Shorab valley, so that the Zainderud, often effete by the time it reaches Isfahan,† might be vigorously strengthened, and thus for ever atone for the shortcomings of the Persian river. The idea has been described as a grand conception worthy of a mighty monarch; in reality it is an illustration of the parable of the man who royally neglected first to count the cost. Though many thousands of workmen have been working for years, at the most advantageous appraising but one-twentieth of the necessary work can as yet have been accomplished. And if the same cheap manual labour were to be employed to finish this "mighty conception," probably one-fiftieth of the cost only has as yet been defrayed. The levels are favourable, and in European hands the task could be accomplished without difficulty, probably by tunnelling. But as to the expected practical effect of such a contemplated diversion, it is well possible for divided opinions to exist. The Kurang can spare the amount of water without hurting an inhabitant on its banks, for it may be safely assumed that such a diversion, if ever accomplished, would not lower the water-level at Shuster by the thousandth part of an inch. On the other hand, it is open to doubt whether, if left to itself in the dry bed of the Zainderud, a drop of the acquired inflow would ever reach Isfahan.

To the north-west of the Kuh-i-Rang, as already noticed, the water-system is at right angles to that in the Bakhtiari country, and for certain reasons has been named Upper Elam. The population here being less homogeneous, makes it difficult to find a common name for the several rivers which, uniting at the southern foot of the Inner range, flow into the plains of Arabistan in one bed under the name of Ab-i-Diz, on which is Dizful (lit. "Dizpul, the bridge over the Diz"). The Ab-i-Diz consists of two main streams; one flowing from near Burujird, and draining the Persian province of Silakhor, must be called the Ab-i-Burujird, though few of the people, Khans or peasants, living in the hills know that it comes from there. The other is a winding (so winding that a portion of it is known locally as the Kakulistan [*]) stream, draining the upper portion of Faraidan, and passing by the important settlement of Baznoi. Hence it had better be called the Ab-i-Baznoi.

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* In the Persian Gulf.

† The river-bed at Julfa was absolutely waterless in September, 1890, on account of the demands of irrigation.

The Ab-i-Burujird enters the Outer range through a magnificent gorge, named after the ruined fort of Bahrain, situated at and commanding its mouth. The Ab-i-Baznoi, with its two main tributaries, the Gowah and the Gokun, also bursts through the Outer range, each by deep and tortuous rifts. Another tributary passing through Pir Said, and rising in the Kuh-i-Rang, is a full-watered stream, and locally considered the head-water of the Ab-i-Diz. That this tradition is incorrect can be seen at a glance from the map.

Notable features of this Bakhtiari country are the pretty hills and lakes it contains. At its south-east end' are three [†] lakes close together. The Silligun, really a double lake (divided in the middle by a low mound, 30 feet above the water), is to the west, and the Chigakhor lake to the east; and though their basins are only a few yards apart, their overflow take exactly opposite directions, both, however, draining eventually into the Kurang. These valleys and their lakes form a favourite resort of the Bakhtiari Khans and upper classes in the summer, having an altitude of 8000 feet. To the north-west, at the inner foot of the Shutrun Kuh, is another lake as yet unknown to the geographical world. It is 2½ miles long and about 1 mile wide, but very deep, with a beautifully coloured water, lying peacefully in this almost deserted valley. Really nameless, even locally—for it is called only "the water of the (neighbouring) low pass"—it might suitably be known henceforth geographically as Lake Irene.[‡] A small salt lake is found on the southern slope of the Zard Kuh not far from the Cherri pass. Roads for pack-animals and riders abound. As a general rule, it may be said that every valley has at least two bridle-paths, one on each side of the watercourse. Besides these valley roads, the two main ranges of this country are traversed by footpaths wherever the least depression in either of them affords a foothold.

But the trafficable cross-roads through the Bakhtiari country are practically limited to those which cross the Inner range at five passes. These are, commencing on the south, the God-i-Murda pass, 7050 feet; it is the easiest of the lot, and is crossed by an excellent bridle-path with easy gradients. Over it leads the most frequented, but yet little frequented, thoroughfare from Isfahan to Shuster, passing through the

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[*] The Lur name for the love-lock worn by Spanish (and other) beauties in front of the ear.

[†] One a double one.

[‡] This lake is said to have been seen by a European a few years ago, an employé of Hotz & Sons, in search of walnut trees.

Chhar Mahals, Naghun (or Ardal), and crossing the Kurang at Dopulun. This road is well known; it is reported closed three to four months in the year by snow. The next pass leaves the last-mentioned "through" route at Ardal, and goes to the Gurab valley by an excellent, well-kept, and bridged bridle-path, and, passing between the Gurab and the Isbiana over a slight undulation, drops sharply down into the Bazuft valley to Kala Bazuft. This Gurab pass can also be reached from Kaj by a well-kept-up path shown in the map.

The next pass is the Cherri, its summit being elevated 9350 feet. On the approach from the east is an ascent of 2000 feet in 3½ miles. The approach from the south is a steep zigzag ascent (from Mowaz, the camping-place at the foot) of 4000 feet. Both the approaches are stony, the southern one especially so, but even now passable for heavily laden mules without difficulty. This pass and the roads leading to it have been kept in good repair until quite lately. The alignments are excellent. If the surface stones were removed (a very small matter), the pass would be the most frequented, giving a far shorter distance from Isfahan to Shuster, between which two places it lies in a straight line and midway. In the days of Hassan Kuli Khan, the last real ruler of the Bakhtiaris, every tribe on its upward and downward journey had to clear up these roads and keep them in thorough repair. He is said to have enforced this excellent rule with severity. Under the present régime, roads and bridges are fast deteriorating.

The next two passes are over the Zard-Kuh range, the Gil-i-Shah touching 11,700 feet; and the Pambakal 11,400 feet. The approaches to both these from the east are, even in June, over snow, but for Persian mules and Bakhtiari horses, neither of them so difficult as not to be in daily use. From the Gil-i-Shah the drop on the south side towards the Bazuft valley is one of 5000 feet, almost perpendicular, as viewed from above. But the well-marked zigzags are worse in appearance than in reality. The Pambakal is very similar to Gil-i-Shah—if anything, more difficult.

These five passes, it may be observed, no doubt have high elevations, and their crests are in winter deep in snow. Not in demand for four to five months of the year, they are left to themselves, and have therefore the reputation of being impassable.

Two other passes of importance, and not belonging to the Outer or Inner ranges, are those to the north and south of the Kuh-i-Rang, dictating the only two ways by which communication can be made between the Bakhtiari country and the Upper Elam. On the north is the Gal-i-Bard-i-Jamal (the pass of Jamal's stone, a conspicuous big detached rock near the top of the pass called after somebody) 10,500 (?) feet on the southern side the Gal-i-Gav (the cattle pass). Both are easy of ascent from the east, but give somewhat steeper, but still easy, descents to the west.

The Outer range is crossed by numerous passes and gorges. Commencing from the south-east, the main ones are—Gardan-i-Halwai, 7500 feet; Gardan-i-Arzana, 8800 feet. Both these passes are easy, being only actual rises of a few hundred feet. At first sight they would seem to be the ones to use for the through route from Isfahan to Shuster in preference to the present route leading over the Gardan-i-Pisi, Kahva rukh, and the Zirreh pass (8300 feet) over the shoulder of the Kuh-i-Sokhta, a nasty climb at all times, to Naghun. For this place an obligatory point can be reached from Isfahan with the same length of road *viâ* Pradumba or Urujan without having to cross any pass of note. But frequently in Persia the traveller wonders why the track he is moving along suddenly leaves a level, hard-surfaced plain to climb a steep hill with rocky surface. One requires to have travelled in knee-deep Persian mud at the time of the melting of the snow to realize the advantages of this otherwise foolish proceeding. In this respect, however, there can be but little to choose between the Kahva rukh route and that of Pradumba, for both tracks cross the Chhar Mahal plains for an equal number of miles. The real reason, perhaps, would seem to be that the latter route passes through a less hospitable country. Being less watered, there are fewer village trees and fewer of the pleasant *kaliun*, with the half-hour chat so dear to the Bakhtiari traveller on business or pleasure, or the eastern districts of the Chhar Mahal are, like most of Persia, waterless and shadeless.

West of the Sokhta (or Zirreh) pass, until we get to Shorab, there is but one pass of consequence, that known as the Ali Kuh pass. Though 9500 feet, it is easy, and is the one to be used on the most direct route from Isfahan to the Cherri. It could be easily permanently closed and obstructed. Near the Shorab the Tang-i-Gezi (with its neighbouring pass of 9500 feet) forms the only passage through the Outer range. The Tang-i-Gezi has an excellent level track on the left bank, about 100 feet above the Zainderud, until it enters the broad track of Faraidan at Chihal Chashma.*

To the north-west of the Kuh-i-Rang the same general rule applies. Every valley (not a gorge) has at least one track for man and beast, but, owing to the more broken nature of the country, and the more thorough manner in which the ranges have been cleft asunder by the peculiar transverse water-system, these tracks compare unfavourably with those of the Bakhtiari country to the south-east of the Kuh-i-Rang. The remains of what must once upon a time have been a main road are to be found more or less along the course of the Baznoi branch of the Diz river. At Baznoi are to be seen the piers and portion of a masonry bridge of a 60-foot span. The arch has fallen, and the chasm is now spanned by a superstructure of trees, wicker, and earth. The approaches to this bridge on either bank can still be traced, and tradition speaks of a broad road having once followed the bed to the plains.

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* The northern mouth of the Tang-i-Gezi to Zard-Kuh is a distance of 16 to 20 miles, not 1½ mile as estimated by a previous traveller in this neighbourhood.

For want of a known general appellation, the country to the north-west of the Kuh-i-Rang has been called in this report by the name of Upper Elam. Of the ancient Elam, with its capital of Susan, and the populated banks of the Kerkha, nothing need be said except that it lay in the plains at the foot of these hills only a few days' march distant. In summer the plains were, as they are nowadays, insufferably hot, whilst this mountainous country is cool, wooded, with peaks covered with snow. It is not extravagant to suppose, therefore, that in those times, even as now, this higher level country was periodically peopled by the same inhabitants as those who had the permanent homes in the Lower Elam of the plains. The course of the river-system bursting into the plains below Pul-i-Kul, the roads even now all converging to that point, the remains of the road and bridge just referred to, the ruins found near Baznoi, a well-watered beautiful spot, at an elevation of 5000 feet, warm in winter, and closely surrounded by mountains 10,000 feet to 13,000 feet, affording the most comfortably cool pastures in summer, point to a previous communication having existed many centuries ago, and tend to show that this country must have been once closely connected politically, as it is geographically, with the ancient kingdom of Sushan the Palace.

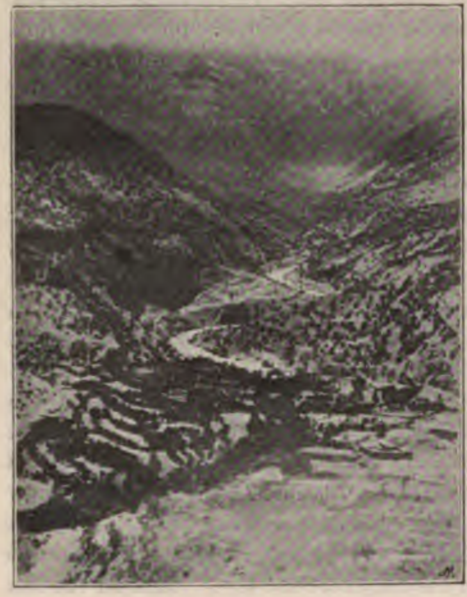
FIG. 8.—THE BASNOI VALLEY.

Every known road coming from the east, north, and west, and passing through this Upper Elam, and leading to the plains, must pass this gap below Pul-i-Kul. And at first sight it would seem natural to suppose that the river-bed or course would afford a natural alignment for such a connection between the plains of Arabistan and the plateau of Persia, for the same streams watering the latter pass through this gap into the former. But the conditions of latitude prevent such a supposition being accepted in fact; for these watercourses, owing to their low altitudes, 4000 to 5000 feet, are so hot in summer, as to make the additional labour due to a neighbouring mountain track preferable to a people to whom time is as nothing, and the advantages due to a good fair level road a matter of indifference. Hence do the tracks now followed by the Ilyats take short cuts over the spurs instead of following the watercourses. Nevertheless, the level river-bed road, which is said to have passed through this gap, and traces of which may be seen at Baznoi (where a branch prolongation northwards leaves the meandering river-course for a time by leading over one high spur into the rolling downs of Zalagi and Burbarud), may be considered to have been an old-world route before the more modern gap of Khuramabad was brought into use. The latter is, perhaps, better suited for demands of the immediate future; for though it has the comparative drawback of being on a higher level than the river-course of the Ab-i-Burujird, for instance, the latter might, owing to its numerous gorges and precipitous banks, require greater initial expenses to receive a civilized road or rail.

The Bakhtiari country enjoys in summer a cool climate; and, possessing verdure, shade, and water, it offers many charms to those who can escape to it from the hot parched plains of Persia. Yet of the natives of Persia, few dare venture within the Outer range. In winter the high altitude gives it, when the sun is hidden by the clouds and the wind blows hard, a severity which is dreaded by the habitual dwellers in tents. The roads and passes are reported closed, and for want of traffic they virtually remain so, till the snow melts and the spring sun modulates the cold air due to elevation. Villages do exist, however, and their inhabitants survive the snow, which is invariably said never to be less than 6 feet deep in the valleys—an elastic figure of speech, meaning, as experienced personally, anything between 6 inches and 3 feet. Nowhere would the simple snow-falls often exceed this latter height in the aggregate. The country is well wooded, and the pastures and meadows are covered with flowers of many kinds. Of the trees the following were met with:—

Two kinds of maple.
Oriental plane (chenar).
Hippophæ Rhamnoides.
Tamarisk (? called gez).
Two kinds of elm.
Oak.
Ilex.
Poplar.
Two kinds of willow.
Ash.
Hornbeam.
Hawthorn.
Rose.
Bramble.
Grape vine.
Hop vine.
Pear.
Walnut.
Alder.
Honeysuckle.
Dogwood.
Gooseberry.

Over 350 flowers have been collected. Some 5 per cent. are reported by Dr. Watt as being new to science, and many of the specimens found are reported as interesting.

The country visited is singularly devoid of any ancient landmarks or evidences of past history. That it had a history is well known, for 2000 to 3000 years ago the inhabitants of these mountain regions left their mark in the world's history. Macedonian soldiers of Alexander's army and Roman detachments of Valerian must have trodden many of these mountain roads, and occasionally garrisoned some strategic points. But only few objects were met with which could in any way possibly be considered links with the distant past. In the Gurab valley, on the summits of low eminences, but commanding the approaches to the valley, were found three ruins of lime-cemented stone buildings of small size. The local tradition concerning them is as follows:—

"Long before the days of the Khosroes, when bows and arrows were the only weapons and iron unknown, there lived in this neighbourhood a king, Farukh Padshah (? Pharoe), who had three sons, Salmon, Tur, and Iraj. On the father's death the three sons, as in duty bound, quarrelled, and each built himself an impregnable aerie, the remains of which still exist, and, bearing their names, vouch for the accuracy of the tradition. In due course they separated, and each formed an empire—the eldest, Salmon, went westwards to Rum; the second, Tur, to Turkestan; and the youngest, Iraj, became the founder of the Iranian empire."

Personal inspection showed the walls to have followed the shape of the hill; they are very thick (3 to 6 feet), constructed of stone, rough hewn, and firmly cemented. The approaches were made in such a manner that only one man could move up to the entrance at a time. The inner space of the ruin of Fort Tur was exceedingly small, not more than 100 square yards; but these remains might only have been those of a citadel. Fort Iraj was viewed from across the valley; it seemed perched on a stony peak, an offshoot of the Kuh-i-Gerra, and its garrison must have had a good view of the surrounding valleys, and have been within signal distance by beacon with the other garrisons of Tur and Salmoni. The stone walls could be made out with the aid of glasses. Fort Salmoni, also viewed from close below, seemed of far greater extent than either of the other two. It has a full view of the Dinarun valley, the crossing of the Tang-i-Ardal, and, what was more important perhaps, the approaches from the east over the Ardal and Naghun passes, and could, moreover, be in view of a beacon burnt on the fourth of these forts situated high up the Sabz-Kuh valley. Could these forts have been of Roman or Greek origin, sites for small garrisons on what is now known as one of the best sections between Fars and Susiana? As before noticed, this Gurab pass, with its easy approach from the Bazuft valley, and its almost level continuation towards the fertile valley of the Zainderud, could now be made one of the easiest direct alignments, as it was no doubt found to have been in years gone by.

Another such fort remains; the fourth was found in a similar strategical position, and, with the same tactical precaution, situated in the fork of two valleys, where two well-marked routes join, commanding the entrance of the south-east end of the Bakhtiari country, close to a magnificent stream of water, on the summit of a spur peak. The site was the selection of a man-at-arms. It is known as the Killa Charghash. The remaining walls are in good preservation, of larger dimensions than those of Killa Tur, and of greater interior space. Traces of separate rooms are clearly visible; search was made for relics, but only a few potsherds could be seen. These may possibly be synchronous with the building, for pottery amongst the present people is unknown. Wood, leather, and iron only are used by them as being the only material to stand the wear and tear of their migrations. The valley this fort commands is now one of the most favourite resorts of the Bakhtiaris, and must also naturally have been so centuries ago. Water, trees, and pasture are found here in abundance now, and must have been so then.

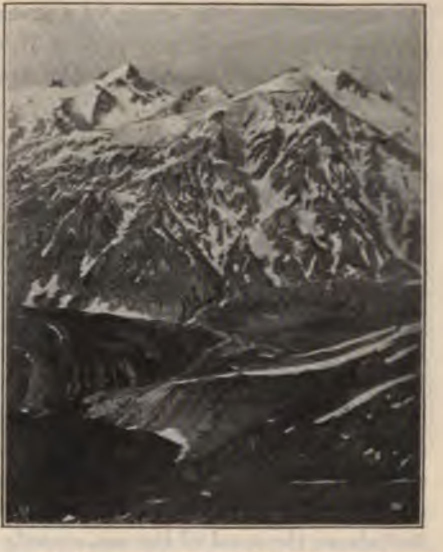

FIG. 9.—THE HAFT TANAN SNOW-PEAK.

It would be interesting if these remains could be declared to be relics of posts erected at important points to domineer the marauding inhabitants, and to form a flank protection to Alexander's line of communications with Persepolis and Pasargardæ twenty-one centuries ago! Locally, as in all Persia, there is not one who could answer the question, were it even possible for him to understand it. A people more utterly ignorant of, or callous to, the history of their own country can hardly be met with. Possibly excavations made by a connoisseur might afford satisfactory answers to such questions. If not of Roman or Greek origin, another theory might be started as to these being refuge places of early Christians, who are known to have been plentiful in South-West Persia in the second and third centuries (and after). Favoured under one reign (Khusroo, etc.), persecuted in another (Bahram Ghur, etc.), they may have peopled the fair valleys of these mountainous regions in the summer months, and erected these small forts as mere places of refuge for property, women, and children!

In this neighbourhood too, on the summit of one of the Sabz-Kuh peaks, are said to be the names inscribed in the rock by "a mighty hunter king that came from the north;" the summit, 11,110 feet, was climbed over snow and crystalline rock, but the snow still lay so thick (in May) as to preclude all hopes of the inscription (?) being seen.

In Upper Elam, besides the bridge and main road already referred to, a cave was visited near the crest of one of the long spurs running west of the Kuh-i-Rang, containing a rather peculiar-shaped pedestal and column. The column is cylindrical, about 14 inches in diameter, and about 3 feet high, and stands on a rough-hewn cubic pedestal about 3 by 2½ feet plan and 3 feet high. The column has distinctly two cut surfaces at the front and near the top, one exactly as if meant to hold an inscription, and the other as if made to hold a transverse piece. Nearly directly above the column hangs the stump of a stalactite, suggesting the idea that the column originally formed part of it, and that the pedestal was placed below the hanging end and the stalactite severed. The column is nearly white, but a small crack at one side (nearest the mouth of the cave) disclosed a darker-coloured substance. The white coating was exceedingly hard, irremovable, forming part of the column. Probably this coating was due merely to the continuous dropping from above. Near by there is in the wall a natural niche with a smooth and level bottom. The cave goes down about 30 feet, at its bottom is level, with three niches large enough to contain a small person each. Diligent search by candlelight was made, but no trace of human or bestial relics were found. The place was clean swept.

The natives connect this cave with an idolatrous past, making it of very ancient date. When viewing the pedestal—its similarity to an altar is striking, the cut at the top for a transverse piece suggesting a cross, the niche ready at hand for the elements—the thought naturally occurs that this cave may have been a catacomb on a small scale 10,000 feet above the level of the sea, a ready-made synagogue for the meetings of a *kat oikon* of rude, but faithful mountain shepherds.

The idea of a Christian history amongst these hills is forced on one in many ways. Even now the outer fringes, like the Char Mahal and the Mahallats, are well sprinkled with thriving Christian (Armenian) villages and communities; and in the interior all the stone ruins indicating villages of fair size are invariably attributed to the Armenians. Along the Parwiz hill many caves, half built up, are to be seen, which by local tradition are connected with strange worshippers. Whilst traversing these till now unexplored regions, which are not far distant from the already discovered records carved in stone, among the lower range (*e.g.* Mal Amir), we invariably made inquiries for such whenever new ground was touched. Hopes were frequently raised, but invariably was disappointment the result of the search. A much-talked-of "Sang Niwishta" ("inscribed stone") was explored with some difficulty. Its site was on a long low spur of the Kuh-i-Rang, which reached as far as Baznoi, known as the Chin-i-Kewar. This spur in itself is most remarkable. It is lower than the surrounding mountains, and suggests, as viewed from a distance, with its comparatively middling altitude of 6700 feet, its well-wooded crest and sides, an all-the-year-round healthy and comfortable habitation. As a matter of fact, this must once have been the case. The ancient stone bridge at Baznoi already mentioned enables the traveller from Susa to reach the talus of this spur, along which even now an excellent high-road, broader and better than any other met with in these parts, moves gradually up to the Kuh-i-Rang, whence the Bakhtiari country can be entered by the Gal-i-Gav, or the Mahallat plateau reached by the road already mentioned leading through the Gokun gap. Up the Gal-i-Gav (10,150 feet) the ascent from Pir Said is 3000 feet, but without difficulty, and the descent into the Upper Kurang valley easier still. Thence through the Tang-i-Gezi the plateau could be reached on still easier terms than through the Gokun. Thus, then, can be traced one of the ancient high-roads from Susa to Iran, and the *raison d'être* of the bridge explained. But there is more to confirm this suggestion. The river at Baznoi flows in a deep bed, and the remains of the ancient bridge clearly show that its builders, unlike the builders of bridges in these present times (in this country), had an eye to the comfort of the wayfarer, and, by making the bridge of the necessary height, rendered the approaches level, avoiding the sharp descents or ascents to bridges so common to modern Persian architecture. This in itself is a sign of a comparatively higher civilization than at present exists.

FIG. 10.—THE GANDAMAN VALLEY.

On the left bank, close to and overlooking the bridge, are the ruined stone walls of a large square enclosure. Inside are to be seen large stone slabs, which originally formed either a cistern above ground, or the covering to a cistern underground. The ruins of an aqueduct leading to this enclosure can here and there be traced without difficulty. The nearest perennial spring is a mile off. In pursuit of the notorious "Sang Niwishta," the road from this ruin leading along the Chin-Kewar was followed for 12 miles, till at nearly sunset the Duzdgah ("the robber's haunt") was reached, and the inscription seen and deciphered! On a piece of rock about 18 feet high and as many thick were scratched with a nail or knife a few letters in the most modern Persian, meaning "David the deceased." So the "Sang Niwishta" of Chin-i-Kewar—heard of more than 100 miles away—with its hopes of a Layard-like discovery, was either a hoax or an evidence of stupidity—the latter for choice; in either case a true disappointment.

On the way to this inscription, however, about 4 miles from the bridge, the ruins of a settlement of houses were visited. The position of the well-cut stones still above ground would seem to indicate a plinth of a few feet. The tracings, as could be seen among the undergrowth, however, showed no signs of any large buildings having existed. Prettily situated in a well-wooded and watered dell, this may at one time have been with Baznoi a favoured spot, and of very ancient date. It is now the haunt of robbers, and travellers, except *en masse*, are said to be rare. The road passed through some very pretty glades, and close to several sweet-water springs. Altogether there are all the elements for a resuscitation under more auspicious circumstances. Any altitude between 5000 and 7000 feet can be obtained.

On the other side of this Baznoi river, on the road leading from Baznoi towards the plains, is a remarkable spot known as Sang Kala ("the stone fort"). At the upper end of a well-wooded and well-watered valley of the same name, detached from the surrounding heights, is a large rock, 100 or so feet high, which has been built up where needed, and turned into what must have been in the days of bows and arrows an impregnable stronghold; outside, but close within bowshot, is a clear spring approachable under cover. This, too, must have an interesting history of its own; but local tradition is silent, and the grey lichen-covered walls tell no tales.

To sportsmen these regions are highly unsatisfactory. One blue hare, one bear and her two cubs, and two pasangs (small ibex) were the only live animals seen. Francolins were, of course, met with in out-of-the-way places in fair quantities, but they afforded but little sport, refusing to rise. The inhabitants, hardy mountaineers, and idle at all times, are invariably scouring the little hills in search of anything that will give an excuse for a shot in season and out of season. Males, females, and young, whatever has life, are hunted down and shot. If the quarry escapes the guns of one valley, it will assuredly sooner or later fall to those in the next. Stalked from every side, and not recognizing the demarcation laid down by man, a wounded bird is frequently the cause of a hunter's quarrel, the commencement perhaps of a tribal feud. No wonder, then, that sport is a matter more of tradition than fact.

To the ordinary tourist most of this country is still impossible, and in parts dangerous. The Kuh-i-Rang, however, as already mentioned, could be reached in ten to twelve days from Isfahan. A strong bamboo cart could be used all the way to the foot of this mountain. Here a base camp could be pitched in perfect safety by arrangement with the Ilkhani and neighbouring petty chiefs, and the most greedy mountaineer has ready to hand a rich and unlimited supply of virgin peaks awaiting conquest.

The Bakhtiari men and women proper are worthy of admiration and sympathy. An ancient race—how ancient no one can tell—they are still a homogeneous people, simple, brave, and dignified, and that in spite of their Persian surroundings, which are in every respect debasing. No Arab or Persian dare poke his nose into these mountains. An Englishman is greeted with cordiality. The chiefs and people long for higher information. What they know is picked up in their contact with Persians and Arabs, not always of the best sort. Without books or records, their traditions have disappeared altogether, or have been so mutilated as to be valueless as throwing light on the nation's doings.

A party of ladies and gentlemen, guarded by only a few armed servants and a few watch-dogs, could spend a pleasant healthy three months amongst these people in their mountain homes; and if their party comprised one capable of performing cataract in addition to distributing eye-lotions and bread pills by the pound, they would be doing a work which will have far greater results than the merely personal reward inherent in the act of doing a passing good to an interesting people in their picturesque and grand mountain homes.

A detailed journal of the journey and botanical notes and some photographs are, no doubt, available for perusal by any one interested in the matter, on application in the proper quarter.

Before the reading of the paper, the President said: We have with us this evening Colonel Sawyer, who has lately surveyed the Bakhtiari country. This is one of the least-known parts of the world, although it belongs to a country which may be considered, as far as history is concerned, one of the most ancient countries in the world. The upper portion of the plains of Kusistan, it will be remembered by most of us who have studied the *Journals* of our Society, have been described by our former President, Sir Henry Rawlinson, and Sir Austen Layard, and the River Karun by Captain Selby of the Indian Government, and by others, but I believe no one has yet described to us the Bakhtiari mountains, and I am sure we shall have a most interesting account of them from Colonel Sawyer.

After the reading of the paper, the following discussion took place:—

Mr. H. F. B. Lynch: Not only those travellers who have been in the country, of whom I have the honour to be one, but a much larger circle will have reason to be exceedingly grateful to Colonel Sawyer for the admirable map of the region of the head-waters of the Karun and Dizful rivers which he has made, and for the description of that region which he has given us to-night. It is a region which for the greater part is a blank on our maps. Our previous knowledge of the country was derived from the writings of a lady, Mrs. Bishop, who travelled in it at the same time as Colonel Sawyer. I regret that Mrs. Bishop is not present here to-night: she would have been far better able than I to supplement in any way the remarks of Colonel Sawyer. Among the few travellers who within more recent times have crossed the mountains of the Bakhtiari—and I may here mention that one of them, Mr. Mackenzie, established the most cordial relations with their chiefs—most have followed the tracks between Shuster and Isfahan. Colonel Sawyer has made us acquainted with the country between Malamir and Khoremabad. In the course of his paper he has placed before us some new geographical facts. He has told us that the Karun, which was supposed to rise in the Zerde Kuh, actually has its source in the Kuh-i-Rang. Further, if I understand him rightly, he divides the range between Khoremabad and towards the eastern limits of the Bakhtiari country into two minor systems, the first, or more northerly, culminating in the Kala Kuh, which feeds the river of Dizful; the second, or more southerly, in the Kuh-i-Rang, which contains the source of the Karun. He denotes by the name of *the outer range* the mountainous country which lies on the east of the central spine of the two systems; the term *inner range* he applies to the mountains on the west. Now, these results and this conception of the geography are matters of the highest importance, and require a little investigation. The range which we are considering is a part of that extensive and continuous system of mountain terraces which support the high lands of Persia, Armenia, and Asia Minor, and lead up like a ladder to their edge. It is the same characteristic scenery whether you cross the system in the country of the Bakhtiari or in that of the Kurds. And just as on the south you rise by these terraces to the rim of the great plateau, so on the north you descend from it by ranges of a similar nature and appearance to the coasts of the Black Sea or the Caspian or to the trough of the river Kur. In the latitude with which we are concerned to-night, the general direction of these terraces is from north-west to south-east; it is in that direction, to change the metaphor, that the grain of the range lies. Colonel Sawyer has shown that at two particular points the grain buckles into two considerable knots: one of these knots is the Kala Kuh, the other is the Kuh-i-Rang. Now, this buckling or circling formation, although no doubt it culminates in the two knots which Colonel Sawyer has mentioned, appears to be characteristic of the whole central system of this part of the range. It was particularly noticeable on the section along which my journey lay between Shuster and Isfahan. I was travelling just south of the thirty-second degree of latitude, which cuts the range in an oblique direction. It may be said, in a general manner, that along the line formed by that latitude, 63 miles of direct distance (I am following the line from west to east) are occupied by a succession of ridge and trough which stretch in more or less regular and parallel lines from north-west to south-east; during 26 miles the circling formation prevails, the chains join hands, you are at the heart of the range; for the remaining 29 miles it is a country of extensive and fairly level uplands, divided by long ridges which follow the normal direction of the range, a country which constitutes an appropriate transition stage between the serried chains of the main system and the even expanse of the plateau. In the first of these three categories may be placed that part of the range which extends from its western limit to the ridge which borders the left bank of the Bazuft river; in the second, the space between that ridge and the left bank of the Karun at Dopolun; in the third, the plateau of Ardel and the upland valley of Char Khor, a country whose outer bulwark is formed by the ridge which I crossed before reaching Paradomba. Beyond this last ridge you recognize at once the familiar features of the Persian plateau. To the first of these three divisions in the structure of the system I understand that Colonel Sawyer would apply the name of *inner range*, and that of *outer range* to the third. These are expressions which may be convenient for topographical purposes, but they are in conflict with the well-known terms of Pish Kuh and Pushti Kuh which are in use among the Persians, and are perhaps scarcely calculated to present a clear conception of that essential unity of plan which underlies the whole structure of this interesting range, and to the elucidation and development of which Colonel Sawyer has contributed so much.

I have only a few words to add as to the Bakhtiari country. Colonel Sawyer mentions it is popularly supposed that this country is closed to traffic during three or four months of the year. That, I believe—and many travellers will bear me out—is owing to the want of communications. The highest pass on the section between Shuster and Isfahan is, I believe, 8000 feet high. I crossed by a pass somewhat higher than that across which Colonel Sawyer's route lay, and which he gives, I believe, as rather under 8000 feet high. Now, if you go 500 miles further north, and come down to the Black Sea from Erzerum to Trebizond, you cross a pass over 8000 feet high, open all the year round. I crossed it myself this February with the greatest possible ease. Everything was covered with snow, mountains, plains, and rivers, across which you might follow for miles the sauntering canter of some long-brushed fox. Although so much further north, it is never closed to caravans, simply owing to the continuous flow of traffic. It is of great importance that we should recognize that this is not an inaccessible country, and the proof of this is one of the most important results of Colonel Sawyer's expedition. He has found that the highest peak in the Bakhtiari country does not exceed 13,000 feet; that the highest pass on the section between Shuster and Isfahan does not exceed 8000 feet. With regard to the Bakhtiaris, I certainly think—and most travellers will agree with me—that they are an exceptionally charming people. I can only compare them, and that very much to their credit, with the Kurds. The comparison soon passes into a contrast. Both peoples have a religion much tempered by elements of which the Koran knows nothing; both are very much in the hands of governments alien to them—the Kurds of Turkey, the Bakhtiaris of Persia. In the first place, there is a contrast in the outward appearance; whereas the Kurd has an aquiline nose, and all the characteristics of a bird of prey, the Bakhtiari is of an entirely different physiognomy—fine gentle brown eyes, and generally a bold and open appearance; both are robbers, but the Bakhtiari is not a mean one, and certainly, if attacked by a superior force, will not be inclined to fly.

Colonel Sawyer alluded to the English legation in Tehran as the only civilized spot in Persia; I can assure him another spot exists: the house of the chiefs of the Bakhtiari. I do not know whether he visited the palace of Paradomba. My recollection is Minton china and portraits of English ladies in riding-habits fresh from Bond Street. I am informed that since Colonel Sawyer was in the country, the chiefs of whom he speaks, Isfendiar Khan and his brothers, have been banished. This is an indication that the power of the Zil-il Sultan is on the increase; as their father was murdered by him, he does not care to see them in the country. On two occasions I remember to have met among the Bakhtiari, types of the Persian gentleman, a type that has long lingered in some parts of Persia, men refined in thought and manners, but forced by circumstances to live as brigands and as robbers.

Mr. **George S. Mackenzie**: It is now so late that I will only say a few words about the country so lately traversed by Colonel Sawyer and Mr. Lynch. It is twenty years since I was there, and I believe I was the first European to cross through direct from Ispahan to Shuster. The object of my journey was to try to open what I believed to be the best and shortest route for the trade of Southern

Persia. Sir Henry Layard traversed the lower and Baron de Bode the upper portion of the country many years before I was there, but their respective routes did not join, and I found great difficulty in ascertaining whether the road was practicable or not for trade caravans. I fully support all Mr. Lynch has said with regard to the character of Bakhtiari chiefs and people. When I first attempted to enter their country from Mahomera, I found great objection raised to Europeans travelling there; but a year or two later, in 1874, I happened to be at Isfahan, and thought I would endeavour to establish friendly relations with the tribe. I knew that the Karun was navigable between Mahomera and Shuster, for Lieut. Selby of the Indian Navy had ascended the river in H.M.S. *Assyria* in 1844. Fortunately for me, the celebrated chief of the Bakhtiaris, Husein Kuli Khan, was at that season encamped in his winter quarters at Mal Emir, near to Shuster, and when I reached Chigakhor, the Eel Beggie inquired as to the object of my visit. I replied that I came merely to make the acquaintance of his chief, and that if he would take me to him I should be much obliged, and would return by the same route if desired. I was wholly unarmed, without any escort, my caravan consisting only of myself, one servant, and two grooms, all mounted on horses. Husein Kuli Khan I found to be a very enlightened man, a perfect type of the chief of such a clan. We became such fast friends that on my second trip (by another route) from Mahomera, when I explained to him the feasibility of utilizing the route, and what a benefit it would be to his country and his people, he offered half the cost of a steamer to navigate the Karun, and said he would become a partner with me in the enterprise. He further gave me his personal guarantee for the safety of all caravans passing through that country to Isfahan. That document is, I believe, in the Bushire residency at the present day.

I have here the report I wrote to the Government in 1875, pointing out the great importance of the Bakhtiari route. The trade of Persia is divided between Russia and England, the Russian trade from the north competing with the British from the Persian Gulf; the one having the Black Sea and Caspian for its base, the other the Persian Gulf, the Tigris, and the Karun. This district is, for British commerce, one of the most important in Persia. During the time of the grain famine in India, large quantities of wheat and barley were shipped to Bombay from this country, and the cultivation of grain could be greatly extended. The Bakhtiari tribe breed valuable mules, and hundreds of horses are shipped annually from this district to India for Government use. Taking Isfahan as a common centre to radiate from, we find the distances to be: From the North, *viâ*—Resht to Tehran, 192 miles; Tehran to Isfahan, 241 miles = 433 miles; From the south, *viâ*—Bushire to Shiraz, 187 miles; Shiraz to Isfahan, 280 miles = 467 miles; making a distance of 44 miles in favour of the north. Isfahan, therefore, *viâ* the Shiraz road, is the furthest point where trade, *viâ* the south, can successfully compete with that entering from the north. The best means of competing with the northern route is to avail of the Karun river, and to utilize the ancient and natural highway through the Bakhtiari country. The distance for animal transport would be Shuster to Isfahan, 266 miles, giving Shuster an advantage of 201 miles over Bushire, and 167 over Resht *viâ* Tehran, making Tehran only 336 miles distant from the southern steamers at Shuster.

These figures show the very great importance of opening up this route, and how valuable are the surveys made by Colonel Sawyer.

The President: The meeting will, I am sure, feel we have had a most interesting account of a country that was very little known to us before, and that Colonel Sawyer has also done a very great and important service by the survey he has made, and you will join with me, I am sure, in giving him a very hearty vote of thanks for his most interesting paper.

Colonel Sawyer's Map.—The instruments used in the construction of this map were an Indian plane-table, a six-inch theodolite, prismatic compass, six aneroids, and six boiling-point thermometers. The survey was carried out, under the direction of Colonel Sawyer, by Imam Sharif, K.B., the well-known native Indian Surveyor, who did most of the plane-tabling, and who persevered with his work, though he was twice on the point of being murdered, and was frequently robbed. The heights were fixed by readings of the aneroids, checked by the boiling-point thermometers.

CONTRIBUTIONS TO THE PHYSICAL GEOGRAPHY OF BRITISH EAST AFRICA.*

By J. W. GREGORY, D.Sc., F.G.S., of the British Museum (Nat. Hist.).

X. The Sources of the Tana.

The lower course of the Tana has been fairly well known since the exploration of Denhardt in 1878;† but practically nothing was known of its middle course until the expeditions of Mr. J. R. W. Piggott in 1889,‡ of Dr. K. Peters in 1890,§ and the ascent of the stern-wheel steamer, the *Kenia*, in 1891.‖ These explorers, however, left the real sources and upper part of the river quite unknown. Mr. Joseph Thomson, in his map, shows as tributaries of the Tana the rivers that rise near the Wanderobbo settlement, west of Doenjo Kajábe, known to the Suahili traders as Mianzini, a name, however, also applied by some of them to the whole of Ukikúyu. All the rivers immediately south of this Thomson assigns to the Athi system; he therefore makes the stream which flows from a small lake north of Ngongo Bagas, near the "first swamp" camp on the Uganda road, work its way into the Athi. Probably impressed by the improbability of the ridge between these two being a main watershed, Mr. Ravenstein correctly includes these in one system, but also carries all the drainage of the Kikúyu uplands, of the so-called "Athi plains," and of the Machakos mountains into the Tana. Höhnel, however, goes to the other extreme, and includes Thomson's source of the Tana, and thirty-four rivers which he and Count Telekí crossed on their march to Ndoro, in the Athi system; he thus limited the Tana basin to the streams that flow from Leikipia round the north base of Kenya, to those draining the southern and eastern slopes of this mountain, and to seventeen streams which rise in the north-eastern district of Ukikúyu. Höhnel's mapping has generally been followed, and the vast steppes crossed between Machakos and Ukikúyu have in consequence ever since been known as the Athi plains.

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* Paper partly read at the Royal Geographical Society, January 15, 1894. Map, p. 384. Concluded from the November number.

† Denhardt, Clemens, "Erkundigungen im äquatorialen Ost-Afrika," *Petermanns Mitt.*, vol. xxvii., 1881, pp. 11-19, 130-143.

‡ Piggott, J. R. W., "Journey to the Upper Tana, 1889," *Proc.* R.G.S., new ser., vol xii., 1890, pp. 129-134.

§ Peters, Carl, "New light on Dark Africa."

‖ Gedge, Ernest, "A Recent Exploration, under Capt. F. G. Dundas, R.N., up the River Tana to Mount Kenia," *Proc.* R.G.S., new ser., vol. xiv., 1892, pp. 513-533; map p. 584.

The work of the Railway Survey seemed to remove any doubt as to the accuracy of this view, as a party followed the Athi ya Máwe (the Stony Athi) from the ford on the Kikúyu track, round the north base, Chanjavi, south-east to the Athi.

I was, however, not at all certain about it, especially as I had not then seen the Railway Survey map. I had been anxious to determine the relative ages of the system of Ukikúyu and the hill ranges of this part of the country; my force was not nearly large enough to allow me to do this, but it occurred to me that the point might be determined indirectly by working straight across country from the south foot of Kenya, past Chanjavi and over the northern Iveti mountains to Machakos, a country which had not been previously visited by Europeans.

In addition to the geological evidence gained by this march, the geographical results were somewhat startling, for they show that the whole of the innumerable rivers and streams of Ukikúyu and even to the south of Ngongo Bagas and part of the drainage of the "Athi plains" really flow into the Tana instead of the Athi. The recently published discovery of Mr. Chanler and Lieut. von Höhnel,* that the Guaso Nyiro, including all the northern drainage of Kenya, the eastern slope of Settima, and all southern Leikipia is lost in the Lorian swamp, reduces the Tana basin on the north; this loss, however, is counterbalanced by gaining on the south one of the richest agricultural districts in East Equatorial Africa.

The upper basin of the Tana may be divided into two secondary basins, that of the Kiroruma and that of the Thikathika.

In the first place, it is necessary to consider the use and correct form of the name Kiroruma, as it is usually applied to a river of quite secondary importance, which is supposed to rise in a large lake high on the eastern flank of Kenya; the lake was named Abayila. The evidence for the existence of this lake is very unsatisfactory, as it has been inserted on the maps on the strength of an itinerary of Mfaki of Jomvu, which was told to Denhardt † by Nasibu of Mombasa. It should be remembered that Mfaki had never seen it. The name Kiroruma has been widely accepted for this tributary of the Tana. Thus Mr. Ravenstein expresses the current opinion when he identifies [*] it with the Guaso Nagut of Von Höhnel and the Mackenzie river of Mr. Piggott. Both the Wakikuyu and Wakamba whom I met near its banks, however, assured me that it was the name of the main river formed by the junction of the Kenau and the Ilyaini.

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* Höhnel, L. von, "Die Chanler-Expedition in Ost-Africa," *Pet. Mitt.*, Bd. xxxix. 1893, pp. 120–122, 146–148; map, pl. ix.; and also "Route Map of a Journey to the East of Mount Kenia," Dec. 5, 1892—Feb. 10, 1893, *Geog. Jour.*, vol. i., 1893, p. 576 with note, by Astor Chanler, pp. 533, 534.

† Denhardt, Clemens, "Erkundigungen im Aquatorialen Ost-Afrika," *Pet. Mitth.* Bd. xxvii., 1881, p. 140.

As to the form of the word, Kiloluma has been most widely accepted, but Kiroruma was certainly that used by the natives with whom I talked, and Denhardt [†] uses Gururuma as a synonym of Kiloluma.

Probably the highest and most remote source of the group of rivers that forms the Kiroruma is the stream that flows from the Lewis glacier on Kenya down the Teleki valley, and emerges on the steppes on Ndoro as the Guaso Nairobi. Its course at first is to the west, and it sweeps round in a great curve some distance from Ndoro, instead of striking to the south-east immediately to the west of Teleki's camp. To the south of the Nairobi flows a smaller river, the Guaso Mairi, which also makes a good sweep to the west. South of this again is the Guaso Thégu, which drains the west-south-west and south-west flanks of Kenya. It flows close past the site of my reserve camp beside the forests (altitude, 7100 feet) and past Teleki's Ndoro camp, to which Höhnel assigns the height of 1939 metres, and then, bending more to the south, goes through a deep forest-clad gorge to the south-west.

The next river of this system is the Thagana, which also flows through a deep ravine and drains the west sides of two conspicuous hills, the Niani and the Larati. This is the river which is marked by Höhnel as the Ngare Nairobi. I was not able to go further to the south-west, but my very intelligent friend and blood-brother, Nyuki, the son of the chief of the district, told me that there is one more river, the Longari, in that direction, and his topographical information was always remarkably correct. These five rivers, he said, all joined together to form the Kenau. This is joined by the Karthuri, which drains a mountain of the same name west of the district of Maranga. The river below this junction is then called the Kiroruma. The names Kenau and Kiroruma are used as synonyms by the Suahili who visit the outskirts of this part of Ukikúyu. This, however, I was told by the chief of Maranga, is not correct.

The most important stream from the north which the river receives in this district is that known as the Ilyáini, which rises at the east foot of a double-peaked pyramidal mountain named Larati, which is south of Ndoro, and north of our camp at Karati. This river receives numerous tributaries from the Niana and the south-west part of Kenya, and also from some which rise in the uplands of the Konu district of Ukikúyu, from which we had frequent views of the broad valley of the Ilyáini.

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[*] *Proc.* R.G.S., new ser., vol. xii., 1890, p. 132, note.

[†] Denhardt, *op. cit.*, p. 14.

Further east the Kiroruma receives several tributaries from the south and south-east slopes of Kenya, which are marked in the maps of Messrs. Hobley * and Dundas. †

The uplands of Ukikúyu are intersected by a deep, sinuous, and complex series of ravines, which have a general trend from north-west to south-east. The streams that have eroded these flow out on to the Kapté plains, and there unite to form a powerful river known as the Thika in its upper course, and the Thikathika nearer its junction with the Tana.

Two members of the system are crossed by the caravan route from Machakos to Kabéti (Fort Smith), at the west side of the so-called Athi plains, near the edge of the great Kikúyu forest. These two rivers are known as the Ngong and the Nyabi; they were believed to join the Athi, and the whole of the part of the Kapté plains through which they flow was in consequence included in the Athi plains. The streams which pass on either side of Fort Smith, and those which rise by the camps known as the first and second swamps, north of the Fort, are also members of this system.

The Thikathika was crossed by Peters, who called it the Dika, but its existence was first made known by Krapf, ‡ who said that the Tana had a tributary in Muea known as the Dika. Denhardt reported it, on the information of Mkaba of Ikanga,§ as coming from the south from the neighbourhood of Kandschallo, which is the lava-capped plateau east of Chanjavi, or, as Höhnel spells it, Kjandjabú. The Thaka of another of Denhardt's informants (*op. cit.*, p. 139) is probably also the Thikathika, though it is said to be north of the Kiloluma. Other variants of the name are Thuaka || and Athika, the latter of which is the Kikúyu form, and may have led to its confusion with the Athi.

The Thikathika must at first flow not far from the edge of the Kikúyu forests, till it bends to the east in the latitude of Chanjavi. At first it is separated from the Athi by a stretch of grass-land about 10 miles broad; this narrows greatly to the north, and near Doenyo Sabuk or Chanjavi the Thikathika and the Athi are separated only by a tract of steppe land, which forms an almost imperceptible divide not more than 3 or 4 miles wide. The former river is here the more difficult to cross; it is broad and deep, and the current strong, and we were only able to cross by a rude bridge of felled trees, by which the Wakamba hunters had connected a small island with both shores. Three miles

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* Hobley, C. W., Sketch Map of the I.B.E.A. Co.'s Kenia Expedition, 1891. Intell. Div. W.O. No. 900.

† Dundas, F. G., Caravan Route from Hameye to Mount Kenia and back. Intell. Div. W.O. No. 886.

‡ Krapf, J. Lewis, 'Travels . . . in East Africa,' p. 257.

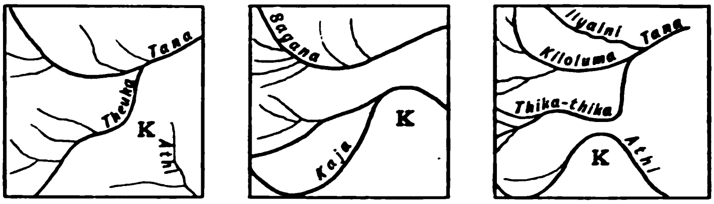
§ Denhardt, *op. cit.*, *Pet. Mitth.*, xxvii. p. 140.

|| Fischer.

below this the course of the Thikathika is broken by its upper group of falls. The river flows at first level with the lava plain, and its banks are covered with fine trees, amid which the wild date palm (*Phœnix*) is conspicuous. It then plunges over a fine fall 60 feet in height, into a deep gorge, along which it flows as a series of picturesque rapids. Its course here is to the north, as it is deflected by a line of lava-covered gneiss hills; after being joined by a tributary from the north-north-west, it bends sharply to the east, and flows through a deep ravine. The hills in this district consist of a number of terraces running north and south, and facing the east with a series of steep slopes. Owing to this the river soon emerges from the ravine, and is again on a level with the surrounding country. The country again sinks rapidly to the east, and a series of gneiss ridges which run from north to south across the river give rise to a lower group of falls which are even grander and more picturesque than the upper series. After this, however, the river rapidly diminishes in volume; it receives no more tributaries, and it enters on a great stretch of gneiss steppes, on which it is subjected to considerable evaporation and absorption by the sandy soil.

The river curves to the south round the base of a rugged line of gneiss crags called Voróni, and then, turning sharply to the north-north-west round its eastern end, flows onward to the Kiroruma. It enters this a little below the deep and dangerous ford where the main river is crossed by the trade route to Maranga, used by the enterprising Wakamba of Kitui.

The different views of the relations of the head-waters of the Tana and the Athi may be more clearly expressed by the aid of the following diagrams:—



(*a*) (*b*) (*c*)

Fig. 7.—Diagrams showing views of relations of head streams of the Tana and Athi, after (*a*) Ravenstein, (*b*) Höhnel, (*c*) Gregory.

The facts as shown in the last are not what would readily have been imagined, as the close approach of the two rivers, and the low divide which in places separates them, led not unnaturally to the view that the two must unite in the rough country north of Chanjavi. Their real relations, however, are most instructive, owing to the evidence these afford as to the relative ages of the mountains and rivers in this district.

XI. The Life Zones of East Africa.

The dependence of animal distribution on that of plants and of the latter on the water-supply is well shown in East Equatorial Africa. On the mountains there is an abundant rainfall, so that they support a luxuriant forest and jungle. Near the coast and beside the rivers the air is very moist, so that the dew is exceptionally heavy and supports a prolific vegetation. But on the high plateaux, that cover the largest part of this region, the air is dry and the rains concentrated into two rainy seasons; the plant life on these is therefore dependent on the capacity of the soil to retain moisture. Geologically the region consists of a vast undulating upland of gneiss, covered in places by wide sheets of volcanic rocks; according to which of the two rocks crops out at the surface, there are one of the two types of vegetation. The volcanic rocks form very rich soil, and they absorb moisture very readily, and only give it up slowly. The result is, that all of these lava tracts are clad in a rich green turf, and have numerous springs; they form the various "rangatan," or high level pasture lands. The gneiss, on the other hand, is very porous, and as the foliation is vertical, all the water that falls upon it rapidly percolates to a depth at which it has no influence on the vegetation. The tracts formed by this rock are therefore barren sandy plains, supporting only irregular tufts of dry grasses and scrub with narrow or spiny leaves, or trees with succulent stems or leaves such as candelabra-like euphobias, aloes, and *Sanseivera*, etc.

The water-supply is the factor that appears at first sight to override all the others, but certain zonal arrangement according to height is well marked. The vegetation is distributed in eight zones:—

1. The coast zone, characterized by groves of coconut palms, mangoes, etc., which is continued inland for some distance by a sub-zone along the larger rivers; here the *Borassus* and *Hypœhne* (*Hyphæne thebaica*) palms are the most typical.

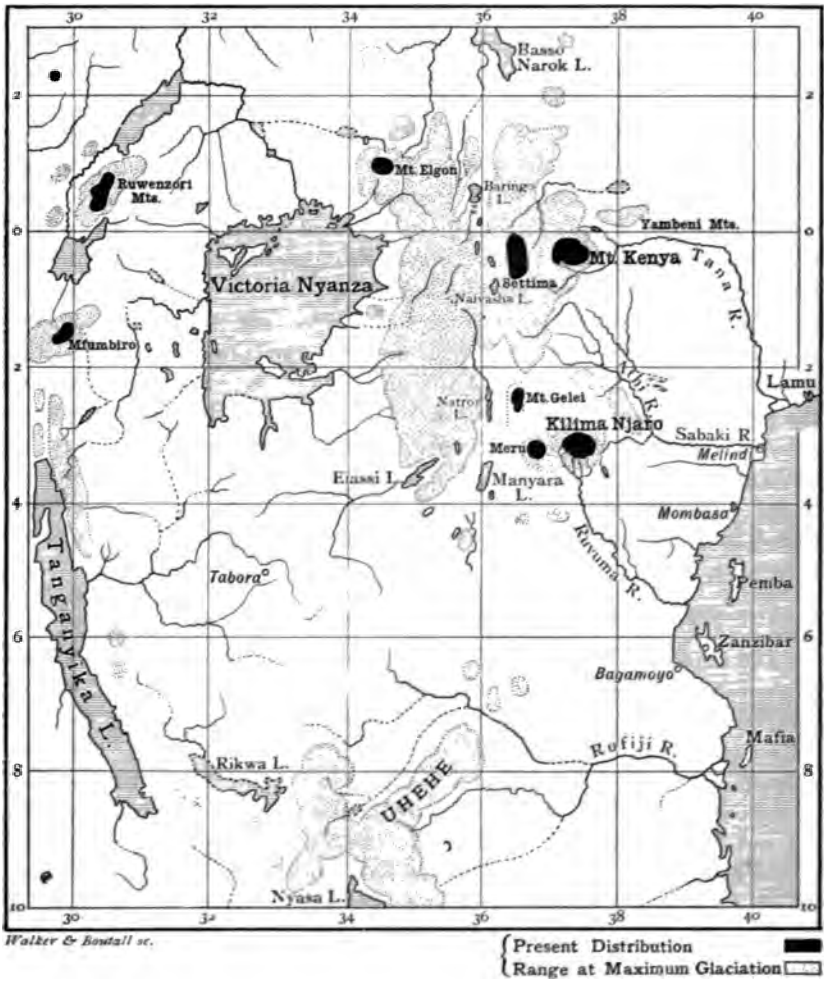
2. The barra, characterized by mimosa scrub and huge cactus-like *euphorbias*, aloes, and *Sanseivera*, and in the rainy season by masses of white convolvuli.

3. The woods of the upland plateaux, which occur in the areas with a heavy rainfall. The prevalence of flowering woody shrubs such as *Dombea*, *Pluchea*, *Calodendron*, etc., is a very marked feature in this zone.

4. The lower forest zone occurs in regions of heavy precipitation around the bases of the higher mountains, such as Settima, Kenya, and Kilima Njaro. It contains such trees as *Podocarpus*, and contains numerous plants of northern genera, such as *Thalictrum*, *Urtica*, etc.

5. The bamboo zone, which occurs between the levels of 8000 and 9800 feet.

6 and 7. The upper and lower Alpine zones, with arborescent groundsels (*Senecio keniense*, Baker, *fils.*), lobelias (*Lobelia gregoriana*, Baker, *fils.*) and tree-heaths, meadow orchids (*Dysa gregorii*) and *Gladiolus*. *Hemichrysum* is abundant in the upper of these two zones.



Walker & Boutall sc.

Fig. 8.—Alpine Flora of East Africa.

8. Above the snow-line, a few dwarf *Hemichrysum* and lichens are the only representatives of vegetable life.

The flora of the two Alpine zones is unquestionably the most interesting of these, for representatives of it occur in isolated patches on the higher peaks. Thus the arborescent *Senecios* and lobelias have representative species on Kilima Njaro, Kenya, in Abyssinia, and the

Cameroons.* Dr. Bowdler Sharpe has noticed a similar distribution of the birds, and founded a Cameroonian subregion for these localities. It appeared, however, difficult to comprehend how this high-level fauna and flora had crossed the intervening low land. This is, however, explained by the discovery of the former extension of the glaciers of Mount Kenya. Well-preserved moraines occur 5400 feet at least below the level of the existing glaciers, and the ice probably extended still lower, as the slopes are there marked by forest and bamboo jungle.† The full evidence of the former glaciation will be subsequently published elsewhere, accompanied by an attempt to estimate the meteorological conditions at the time. The most important point to be considered in connection with the subject here is the influence this would have had on the former distribution of the flora. If we assume that the Alpine flora had extended an equal distance below its present level as the glaciers advanced, then it would have descended to the foot contour, and have had a much wider extension across the country than it at present possesses. Fig. 8 shows the present probable distribution of the Alpine flora, and that which it would have had at the period of maximum glaciation. The connection between the East African region and the Cameroons is still uncertain, as we know so little of the intervening country, but this map shows that there would be no difficulty in explaining the distribution of this Alpine flora throughout the district in East Africa in which isolated remnants of it survive.

XII. THE FORMER COURSE OF THE NILE.

The anomalies of zoological distribution, especially in regard to the fresh-water faunas, appear still more difficult of explanation, unless considered in the light of geological changes. In describing the fish collections made by Petherick on the Upper Nile, Dr. A. Günther pointed out that the fish fauna must have originated in the central plateau of Africa, and thence migrated radially in every direction. It did not seem, however, possible thus to account for the presence of representatives of this fauna in the Nile tributaries of Abyssinia, and its absence in the Lower Nile and its reappearance in the lake of Galilee. The consideration of the original connection between the rivers of Syria and Central Africa would take us into regions far outside the area dealt with in this paper; but the communication between the Nile and the rift-valley must be referred to. Professor Suess, in his h/ masterly memoir, "Die Bruc~~k~~e des Ost-Afrika," ‡ has previously shown that there must have been a connection between the rift-valley and the Nile, as *Corbicula fluminalis* occurs in both.

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* For the distribution of the latter, see E. G. Baker, "African Species of *Lobelia*, § *Rhynchopetalum*," *Jour. Bot.*, vol. xxxii., 1894, pp. 65–70, pls. 340, 341.

† *Denk. k. Ak. Wiss. Wien. Bd.* lviii. (1891), 1892, pp. 562, 579.

‡ 'Contributions to the Geology of British East Africa,' pt. i., "The Glacial Geology of Mount Kenya," *Quart. Jour. Geol. Soc.*, vol. 1, 1394, pt. 4.

The proof, which I hope subsequently to publish, of the Pleistocene age of some of the meridional faults, and of the existence of a former outlet from Baringo over the Lobat Pass to the north, shows that the river system must have been very differently arranged in times geologically quite recent.

The sketch-map (Fig. 9) shows what was probably the former course of the Nile. South of Gondokoro the Nile flows through a deep gorge cut in a plateau, which varies from 3500 to over 4000 feet in height; the river enters this at the level of about 1600 feet, and at Mwutan Nzige (Albert Nyanza) is only 2300 feet high. Wadelei, near the southern end of the gorge, is at the elevation of 2200 feet. East and west from this point runs the line of highest land on the plateau, and this forms the watershed, sending streams off to the north and south. All these on the eastern side of this range enter the Somerset Nile, while those to the west form the sources of the Welle and Bomokandi, and thus belong to the Congo. Before the formation of the Wadelai gorge the sources of the Nile must have been situated on the northern side of this chain of highlands, of which the principal ones, going from west to east, are the Schweinfurth mountains, Junker mountains, Faigoro and Moro. The drainage of the southern slopes must have accumulated within the basins of the Nyanza and Mwutan Nzige, and thence flowed probably to the north-east. It possibly escaped by the line of lowland now occupied by the Masange lake chain through Lake Salisbury, and thence into the main "rift-valley" by the valley of the Turkwell (Turquell). The gorge of the Nile probably originated as a valley of subsidence and not of erosion, in the same way as did that of the main eastern "rift-valley." Elevation on an intervening line probably occurred at the

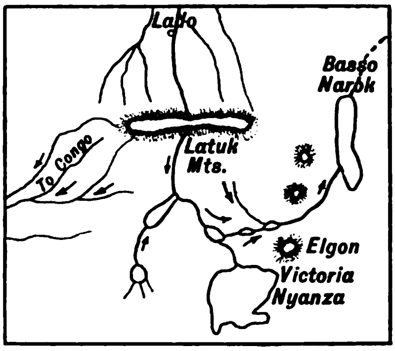

Fig. 9.—Sketch-map showing probable original source of the Nile and outlet of the drainage of the Nyanza group of lakes before formation of gorge through the Latuk mountains.

same time; the mountains of Elgon, Lekakisera and Dabasien were probably all volcanoes on the site of a meridional line of uplift. This broke across the valley by which the waters of the Central Basin were discharged; the Turkwell continued to flow to the north-east, while the Masange reversed its direction, and, joining the rivers that flowed from the great lakes, passed through the newly formed valley, and thus the Nyanza became the principal source of the Nile.

Sir JOHN KIRK, Vice-President (who occupied the chair), said before the reading of the paper: I have now to call upon Dr. Gregory to give you an account of an adventurous journey he made from the coast to the snow mountain Kenia and the lakes in the interior, after which Sir Wm. Flower, under whose able direction Dr. Gregory serves in the British Museum, will be able to give you some further account as to how the expedition was fitted out and the way Dr. Gregory did his work.

After the reading of the paper, the following discussion took place:—

Sir WILLIAM H. FLOWER: I am glad to have your permission to say a few words on this expedition. About the end of October, 1892, I received from Dr. Woodward, keeper of the department in which Dr. Gregory works in the British Museum, an application on behalf of Dr. Gregory for rather extended leave of absence, to accompany the expedition then being organized by Lieut. Villiers of the Horse Guards and others to explore Lake Rudolph, and then through part of Somaliland to the Red Sea, passing through some districts that had never been explored before by Europeans. As it was desired by the members of the expedition that it should not be devoted wholly to the pursuit of game, but also should be turned to the advantages of science, they very properly wished to have with them a man who could make scientific observations; they also very wisely fixed upon Dr. Gregory to be that man. It was my duty to inquire into the circumstances under which it was proposed that Dr. Gregory should go before I could advise the Trustees as to whether, in the interests of the museum, it was desirable that he should accompany the expedition, which of course was our first consideration, as Dr. Gregory is an officer in the public service. It seemed to me, and also to the Trustees, that many advantages would accrue from allowing him to accompany this expedition. In the first place, he was to be taken out and to be brought back free of all expense; he was to have the whole of his time, when with the expedition, to devote to scientific observations and collections, and of the latter all such as were required were to be the property of the museum. Then we had to consider whether Dr. Gregory was a fit person to be allowed to accompany the expedition. I don't think any one could have been found more admirably qualified in every respect. He was not, as so many officers of museums are, only a specialist in one particular department. He was mainly a geologist, being attached to the Geological Department, but he was also what we may call an all-round man in scientific matters, having much knowledge of and interest in other branches of natural history; and, moreover, he had paid special attention to the particular problems involved in that part of the world to which the expedition was directed. It was also thought it might be of advantage for his future work in the museum if he were allowed for once to break the ordinary routine of continued description and arrangement of specimens, and study nature face to face in her inmost fastnesses. Under all these circumstances, permission was given for Dr. Gregory to absent himself and join the expedition. He has told you briefly how it entirely collapsed almost from the time it arrived on the east coast, and how he was left entirely to his own resources. When we heard in England what had taken place, the question was what position did Dr. Gregory occupy. His leave had been given him specially to accompany this expedition and collect for the museum with the facilities offered him; and it was thought the best and most likely thing he would do would be to return home as the other members had done. I was urged by some of his friends to telegraph to him to do so. I did not do so, because it was so difficult for us in England to judge, with the scanty information before us, what his circumstances might be, or what arrangements he might have made, but I wrote and told him that his first duty to the museum was to bring himself back safe and well, and that he should not run any great risks, which I feared his great interest and enthusiasm in the subject might lead him into. And the Trustees altered the conditions of the leave given him so as to allow him full liberty to act as he thought best under the difficult circumstances. You have heard what he did: he organized an expedition entirely on his own resources and at his own expense, except that certain stores and goods, which happened to be left by his former companions, were placed at his disposal. This expedition he accomplished with a remarkable amount of courage, judgment, and fertility of resource. As to the scientific results, he has this evening given you an outline of the gain to geographical science, and to a certain extent the geological results, though we shall hear more about these afterwards; and I may be expected to say a few words as to the collection which he has brought home to the museum, the primary object of his expedition. There is no doubt that if Dr. Gregory had been merely attached to a large expedition, with all his time at his own disposal to make scientific observations and collections, he might have done very much more than he did; but we must remember that he was the only European in the expedition, his endeavours to find at Mombasa a European to go with him and assist him collect and skin animals having been quite unsuccessful. He had to manage everything for the whole expedition, rising two or three times every night to see that his men were keeping their watch, making all arrangements with the various and sometimes hostile tribes through whose country they passed, finding his way through an unknown land, and performing all the duties that generally fall not only to the general, but to all the different members of the staff, including the doctor, of a little army. It is perfectly wonderful that under these circumstances he was able, not only to make a considerable number of scientific observations in geography and geology, but also to bring home a very important collection of rocks, fossils, and zoological and botanical specimens. These have not at present been completely worked out, and it is, therefore, too soon to do more than give an outline of what they really are. The rocks have the great advantage of having the actual localities in which they were found *in situ* carefully noted, but they must be cut in sections and fully examined before the whole story they tell us can be revealed. The botanical specimens, I am happy to say, Mr. Carruthers of the Botanical Department of the British Museum will give us some account of presently. With regard to the zoological collection, in the first place it must be noted that the country the expedition passed through is extremely poor in the higher vertebrata, but among the mammals brought home is a new species of rodent of the genus *Aulacodus*. The reptiles, lizards, and fish from the rivers are now being worked out by Dr. Günther. They promise to be of great interest, the fish especially being allied to forms found in the Nile basin and not in the Indian Ocean, and the land and fresh-water mollusca tell the same story. There are also considerable numbers of insects, arachnids, myriapods, and earthworms, all in a good state of preservation, of each of which sections I trust before long we shall have descriptions at the Zoological Society. I am merely mentioning these in order to show you that, although not equal to what was hoped for under the more favourable auspices under which it was expected that Dr. Gregory would have worked, his journey has not been without important scientific results, and he has undoubtedly proved himself a most capable and energetic explorer.

Prof. T. G. BONNEY.—I have really no right to offer any remarks upon the interesting paper to which we have listened, as I have never set foot in Africa; still there are one or two points in it to which it may be worth while to direct your attention. The first is that in this very interesting region, which I think, from the course of the rivers, must be one of the oldest in Africa, we have, as Dr. Gregory pointed out, a very remarkable group of earth structures which, as he told you, can be traced over other parts of the globe. We observe two kinds of hollows, viz. the round basin-like hollow and the long trough-like hollow, filled sometimes by fresh water and sometimes by salt water; and we can trace such basins down to the deep parts of the ocean. We have also great uplifted masses—"horsts" on a large scale—and we have long fold-masses such as may be seen in mountain chains. Looking at the map on the wall, I could not help thinking, not only how like these long basins are to the Red Sea, but also how they resemble in outline a bas-relief of Madagascar and other islands, and it seems to me that when Dr. Gregory comes to work out his results, he will be able to throw very interesting light both on the "horsts" of Professor Suess and the fold theory of Professor Lapworth. I believe that both these theories are true, but that neither is universally true. There are regions where the one theory applies, and regions where the other applies. In other words, I believe that the structure of the earth's crust is too complicated to be accounted for by any one generalization.

Turning to the subject of glaciers, I was greatly struck with the remarkable extension of the moraines on Mount Kenya—down to more than 5000 feet below the present limit of the glaciers. That seems a matter of very great interest, apart from its bearing on the distribution of the flora and fauna, and to be a very significant fact at the present time, when we are trying to account for the Glacial Epoch. Of the two theories advanced for this purpose, the Geographical one fails to give us quite as much cold as we want. Now, when we find glaciers coming down so low under the equator, this seems to imply, if it be found elsewhere, that the cause of the extensive glaciation was not something that affected the one hemisphere or the other hemisphere, but the earth as a whole. These are the two points that struck me most of all. I think, speaking as one who has had a little mountain experience, that, unless Dr. Gregory has been flattering Mount Kenya in his picture, he was very wise not to attempt going further up without companions, as it looks a stiffish mountain to tackle, and had he gone further up I am afraid he might not have come down. We must have been struck with the energy and resolution he displayed. As Sir William H. Flower said, he is a singularly all-round man; in fact, even as a geologist, I never know where to classify him. He is supposed to be a palæontologist, but he is quite as much a petrologist; he has also that determination and pluck which shows that all the good blood has not yet gone out of the Englishman.

Captain F. D. LUGARD: I had understood that I should not be called upon to speak, and, being unprepared, I will only say one or two words. Perhaps few can appreciate more than I can (having travelled in the country myself) the pluck shown by Dr. Gregory. I think that nobody has ever been through Masailand without at least 100 or 130 armed men. Dr. Gregory, with no previous knowledge of the country, found himself left in the lurch on the coast, and determined not to abandon his enterprise and confess to failure. He got together some forty odd men on the coast, and started up-country with only ten days' delay, and consequently he had no time to carefully choose and select his men. He went up through the most dangerous part of the country, about the time of the rains, which meant that he must encounter large numbers of the Masai, who come down to graze their flocks at that season. He went from Naivasha, the head-quarters of the Masai, into the Laikipia country, where no one had passed before him, and from which Mr. Thomson had to fly for his life after getting to the lower slopes only of Kenia. Dr. Gregory nevertheless passed boldly through Laikipia, and turned down through Kikúyu, as dangerous a country as you could find in Africa, without any fighting, and managed to make friends with the people. I think I am right in saying that the traveller who had preceded him here, and to whom he alludes without giving his name, was not an Englishman, but an Austrian. I should like to say one or two words about the general lie of the country. After the scientific paper that has been read, and the speeches which have followed, it would be presumptuous in me to attempt any detailed criticism; but perhaps it will be useful if I say something about the general elevation of the country. Dr. Gregory spoke of the coast zone as a narrow strip 10 to 15 miles broad covered with palm trees. There is no malarial country near the coast, as is the case on almost the whole of the rest of the East African littoral. In the German sphere it is, I believe, necessary to pass through much swampy ground; similarly at Mozambique and the mouth of the Zambesi. In the British sphere, from the mouth of the Juba to the mouth of the Wanga, the belt of country which borders the coast—part of the British protectorate of Zanzibar—is entirely free from swamps. The land rises continuously in elevation almost from the very sea-shore. Crossing a small range of hills, some 15 miles inland, we enter a country which we will call the second zone. It is at present unfertile, covered with scrub, and badly watered. The soil, I think, is fairly good, but arid and parched, for there is little herbage to retain moisture, and very few streams. Some hundred miles or so from the coast, measured at right angles to it, we come on to the highlands which form the bulk of British East Africa. There is a rapid rise to 5000 feet; the greater part of Kikúyu is 7500; and at the Mau escarpment reaches a height of 8000 to 10,000 feet. This lofty plateau extends from Lake Baringo to the borders of the German sphere. Beyond this plateau (proceeding still inland) there is a sudden drop to the central lake district. All this lake country maintains an average height of some 4000 feet. Dr. Gregory speaks of the Masai plateau (6000 feet) as constituting the central meridional rift. But the deepest rift which extends through the heart of the continent is on the further side (west) of the Mau plateau. Beginning with the lake Nyasa (only 1700 feet), where soundings have been taken up to 80 fathoms without bottom, it is interrupted by a plateau of some 150 miles, and then extends along Tanganyika. Again the rift is broken north of Tanganyika, but is resumed in the Semliki valley, the Albert lake (2000 feet), and then stretches away uninterruptedly along the Nile valley to Egypt. Thus British East Africa is a high formation falling away towards the German sphere to the south and towards this great chasm on the west. Similarly, it falls away to the north towards Lake Rudolf and the Nile valley. It is worth while to point out this peculiar formation, for unless it is understood that East Africa consists of such lofty plateaux, it would be natural to suppose that its climate, rainfall, and fertility had been described in optimistic terms. This great altitude makes the country between the coast and the Victoria lake the most fertile I have seen anywhere in Africa. Dr. Gregory did not say much about zoology, for the high grass in the country he passed through is not favourable to animal life. Through the central part, where the country is more open, there are enormous quantities of game of various kinds; but where tall bamboo grass and dense vegetation clothe the country the fauna are not so abundant.

Mr. W. CARRUTHERS: I am glad to have the opportunity of making a few remarks on the botanical results of the expedition. But I would like first to say that the more I know of the work Dr. Gregory has done, the more I am filled with admiration of his pluck and perseverance. It is almost impossible to realize the difficulties he had to contend with and which he overcame. There is not a very large collection of plants, but it is large in view of the conditions under which the plants were collected, and the perils and difficulties that beset him throughout his journey. The collection nevertheless contains a good many interesting plants. He has referred to the species of *Senecio.* The tree groundsels are a characteristic feature of the vegetation of the highest mountains of Central Africa. One species occurs in Abyssinia, another on the Cameroons, a third on Kilimanjaro, and now I am glad to say Dr. Gregory has found a new species on Kenia. Another group of plants also characteristic of these high African mountains, but which Dr. Gregory has not mentioned, is the tree lobelias. It is interesting to note that plants so humble in the species with which we are here acquainted, are represented in these regions by arborescent forms. Tree lobelias are known from Abyssinia, Cameroons, Kilimanjaro and Kenia. Dr. Gregory brought home two species, one of which has already been described, but the other is new to science; and it will witness to one of the most interesting botanical results of his expedition as it will bear the name of *Lobelia Gregorii.* Dr. Gregory's plants demand a word or two in reference to the light they throw on the distribution of vegetable life in Central Africa. The plants of the coast-level are pretty well known, but the less-known plants of the higher elevations have a special interest, because on these isolated mountains we find a mixed vegetation having affinities with the European and Mediterranean floras on the one side, and the South African flora on the other. Thus among Dr. Gregory's collection there are two Alchemillas, a Cardamine, a Thalictrum, an Anagallis, and a Veronica, genera with which we are familiar in our fields. Associated with them are several southern forms, amongst which I may mention a new species of heath. In the collection made on Milanji in Nyasaland by Mr. Whyte, under the direction of H. H. Johnston, H.M. Commissioner, which were worked out at the British Museum, we found two species of heath, carrying the Cape type further north in tropical Africa than was previously known; and now the species collected by Dr. Gregory on Kenia extends its distribution fifteen degrees beyond Milanji. A striking Helichrysum belongs to the same southern type, and I need only further allude to a new Disa which connects geographically the two species from Abyssinia with the single species from Kilimanjaro, and the large number of species found further south. The botanical results of the expedition will, from these illustrations, be seen to be important from the point of view of the geographical distribution of plants, while in the collection—which is, as I have said, necessarily limited—there are important additions to the flora of the regions explored.

Mr. W. W. A. Fitzgerald: I have listened to Dr. Gregory's paper with great pleasure—the more so as I was brought into intimate connection with him when camped on the Tana river, where he arrived with only one man after the break-up of the Villiers expedition to which he has referred, and I certainly would not have been surprised if, after what he had gone through, he had returned at once to England. He then came down to examine the country between the Tana and the Sabaki rivers, but the next day collapsed with dysentery and fever; when he recovered I expected he would have made up his mind to go straight down to Mombasa and home, but his first words were, "I think I shall start an expedition to get up to Lake Baringo." Apart from its other qualities, I think his lecture especially well timed, and explorers like Dr. Gregory and Captain Lugard deserve our special thanks for having brought us much knowledge and enlarged our information so greatly of this, until comparatively recently, hitherto unknown continent. Perhaps my remarks will carry a little more weight when I mention that I was sent out by the I.B.E.A. Company to report on the agricultural capabilities of that portion of the British sphere situated within the coast zone, and we may certainly congratulate ourselves on having come off not second best as regards the future possibilities of this country. Perhaps our children will realize better than ourselves the great advantages, capabilities, and value, from an agricultural point of view, of this coast land. And I should like here to bring into deserved prominence the very important part our chairman, Sir John Kirk, has taken in being the first to bring into notice the great capabilities of this country, for we owe our knowledge of the most valuable rubber vine and the richness of the country in fibre-producing plants to him alone. The British coast sphere extends for 400 miles, and I have visited the greater portion of this, including Zanzibar, Pemba, and the fertile islands adjacent to the coast, and it enables me to speak with some certainty of the great advantages of this country from an agricultural point of view. It is blessed with a sufficient rainfall, and the reports I had received of the fertility of the soil had prepared me to find something good, but not the remarkable and uniform fertility of these coast lands. I think the land will be in the future the most important producer of the four following products: *cotton*, of specially great importance to England; *coconuts; rubber;* and *oils* (oil-bearing plants), of which I would specially particularize *gingelly* and *ground nuts.* With regard to the native population, the nature of my work has brought me into more intimate connection with them than falls to the lot of most Europeans, and I have been greatly struck with their great adaptability; from the Arab slaveowner and landowner down to the lowest and poorest native, all seem ready to take up the cultivation of promising products, and the coming of the Englishman has already taught them what might be done in the country in this direction. All they want is a little training to make them willing to exert themselves to develop the great agricultural capabilities of the country.

One result of the British occupation of this country has certainly been to make a very palpable impression on the slave trade. Until now the only cultivators of the soil were slaves, and so it necessarily follows that, as the slaves decrease in number, the land is likewise going out of cultivation. The remedy for this is, however, easily found, and it also has struck others before me. Certainly what will teach the natives of Africa the benefits of steady labour and bring the land to a higher state of cultivation will be the immigration of the loyal race of Hindus, a peaceful, steady, agricultural people, who should prove a very powerful factor for good, and further help to solve the future labour question of this rich and fertile country.

Sir JOHN KIRK: I think you will ask me to propose a vote of thanks to the lecturer and the gentlemen who have so kindly spoken this evening. We have all been delighted to hear the story of Dr. Gregory's journey. It is only nine years since this Society sent out Mr. Joseph Thomson, who was the first to explore this country scientifically. I think it is a remarkably good record to have got the whole of this country under British influence in nine years, and now we are perfectly free to develop it at our leisure. It is our duty to learn all we can about it, and the discussion this evening will do much to enlighten the British public on the nature of the country.

APPENDIX.

LIST OF ALTITUDES.

Correct determination of altitudes was essential to the geological formed the main purpose of the expedition. There was nothing, therefo I more regretted the circumstances under which the expedition wa than the consequent imperfection of my geographical equipment for this purpose. I had only two boiling-point thermometers and one pocket-aneroid. The two former were by Watson, and gave excellent results. The aneroid was one of Short & Mason's, and gave fair results. It was graduated only to 21 inches, so that I had to leave it behind when I reached a certain elevation on Kenya and Longonot.

Thermometrical Observations.—The boiling-point thermometers were used very frequently from the time I arrived at Nzaoi, at the entrance to the Iveti mountains, on March 15, until my return there on July 29. In critical districts they were used nearly every day, and often two or three times in one day. Every possible care was taken. Rain-water was used, and kept specially for the purpose. Both instruments were always used, so that one might check the other.

The results obtained were corrected for index error of the instruments, and for diurnal variation.

Barometrical Observations.—The altitudes thus determined were used as the basis for the aneroid observations. This instrument was used only to measure differences from the points fixed by the thermometrical observations; it was never trusted for absolute heights. The readings of the aneroid were corrected for (1) diurnal variation; (2) temperature of intermediate air; (3) latitude; (4) decrease of gravity; (5) height of lower station. In most cases, corrections 2–5 were so small as to be negligible. A sixth correction was necessary to eliminate alterations of the index error of the aneroid. These alterations were twofold—

1. Regular variation from effects of prolonged exposure to different pressure.
2. Irregular variations, probably due to shaking of the aneroid on the march.

The former of these is now well known from the work of Mr. Whymper. Twice during the expedition I retraversed an old route for some distance, in order to determine any such variation. The first of these was on the march from the Kikuyu country on to Laikipia and back again; readings were taken at exactly the same points, and, as far as possible, at the same time of day. It was found that the aneroid's fortnight's rest under diminished pressure while I was on Kenya, resulted in a fall of ·15″.

The comparisons taken between Kibwezi and Nzaoi on the journeys up and down allowed of a longer series of comparisons; the mean shows that the aneroid fell ·74″ owing to the three and a half months' exposure to diminished pressure.

The irregular variation is also easily dealt with, but considerable errors would have crept in had it been neglected. It appeared to be due to shaking during transit, for it became most marked after a traverse of rough country, a rapid descent of a mountain, a run after wounded game, or a day's path-cutting. After a period of easy going, the error would diminish. Thus, to take one case: Teleki's camp at Ndoro was determined as 6582 feet by boiling-point observations. At Karati, when next the instruments were compared, the aneroid gave 107 feet in excess of the thermometers; this was no doubt due to the roughness of the march between those stations. After this the route followed a beaten track; the aneroid excess therefore fell gradually to 8 feet at Kithu-Uri (3896 feet by thermometers, and 3904 feet by aneroid), and to nothing at the ford across the Kiloluma, where both methods gave exactly 3350 feet. Later on two days' rough work made the difference rise to 100 feet.

Diurnal Variation.—As 5.45 a.m. was the most convenient hour for the observation of the instruments; this was taken as the standard, and all others reduced to it. This is not ideally the best time, as it is two hours after the morning minimum; but the difference is only a matter of some 20 feet. Whenever a camp was kept in one place for a few days, readings were taken to determine diurnal variation. This, however, I was not able to do so frequently as I should have liked. The variation was greater than I expected, and seems to be very uniform, except on the coast. At Zanzibar the daily mean variation is ·078", according to figures kindly given me by Mr. Ravenstein. At Melindi the daily variation was ·11"; on the Magarini Hills, March 3 gave ·09", and the next day as much as ·15". These observations, however, were made near the coast, and are not considered in reference to the series taken on the plateaux of the interior.

On Laikipia and at Njemps the variation varied from ·07" to ·05", and I have taken the mean for this district as ·01" per hour. This forms a very fair average. The rate varies, however, with the weather. After a cloudy morning, the maximum, which usually occurs at 10 o'clock, is much retarded. On Laikipia, the evening rise from the afternoon minimum to the usual maximum at a little before midnight was sometimes interrupted by the dispersal of the clouds.

Comparison of Results of the Two Methods.—These on the whole were fairly in accord. The difference is usually from about 50 to 70 feet; sometimes for a few days they would agree exactly, and at others rise to from 120 to 150 feet. At Larabwal, a difference of 1800 feet occurred at one point in a series which elsewhere differ about 70 feet; this was probably due to the use of bad water. I had had to drink the rain-water kept for this purpose, and was obliged at this camp to use some slimy and brackish water, which no doubt had a different boiling-point.

Comparison of Results with those of other Observers.—These are, as a rule, lower than those of previous observers. Thus the altitudes of the Railway Survey are from 60 to 240 feet higher than mine. In this survey I understand aneroids only were used. The difference is probably due to an alteration in the index error of the survey instruments after long exposure to diminished pressure. Thus the difference between us is only 100 feet at Kibwezi, Nzaoi, and Machakos; it rises to 150 feet at Naivasha, and finally to 240 feet on Kamasia. With Lieut. von Höhnel's results the differences do not admit of such easy explanation, as there is no definite relation between them. Njemps he makes 480 feet higher than the results here given, and 350 feet higher than those of the Railway Survey. It is probable that his aneroids were strained on Kenya, and thus recorded too low a pressure for some time afterwards. As a consequence of this, though he crossed the rivers of the Guaso Nyiro series lower than I did, he gives his ford a higher elevation.

Mr. Joseph Thomson was the lucky possessor of a mercurial barometer. I am, therefore, very glad to find how closely our results agree. Unfortunately, I have only been able to compare observations at two points; the better of these is Lake Baringo, which he assigns to a level within 17 feet of that indicated by my observations.

LIST OF ALTITUDES.

Locality.	District.	Alt. in feet.
Summit of Mambrui hills	Mambrui	190
Summit of Magarini hills	Melindi	440
Meteorological station on Magarini hills	"	370
Camp at Ndi: foot of mountains	Taita mountains	2550
Summit of Ndi mountain	" "	5640
Kibwezi	Kikumbuliu	2900
Camp at Nzaoi	Iveti mountains	3700
Summit of peak of Nzaoi	" "	6000
Camp at Kilungu	" "	4060
Mount Etwa, in Kilungu	" "	6120

Locality.	District.	Alt. in feet.
Pass of Kwathome	Iveti mountains	4750
Totutha: east ridge of Kwathome pass	" "	6050
Givoni: west ridge of Kwathome pass	" "	6780
Col to south of summit of Givoni, leading to Mbani	" "	5970
Machakos: the Company's fort	" "	5300
Machakos: summit of col leading to Kavaluki valley	" "	5740
Camp in Kavaluki valley	" "	4470
Ford over second or "Kiboko" branch of Athi river	Kapté plains	4830
Steppes forming watershed between Athi and Tana basins	"	5300
Camp by Ngong river: edge of Kikuyu forests	"	5400
Fort Smith: Kabeti	West Kikuyu	6310
Camp at "second swamp:" north border of Kikuyu	"	6780
Summit of "Kedong pass:" edge of Kikuyu scarp	"	7050
Camp (No. 36) on platform of face of Kikuyu scarp	Rift Valley: Kedong basin	5880
Camp (No. 37) north-west of first Kedong camp	" " "	5670
Summit of Doenyo Nyuki	" " "	6240
Summit of Longonot pass	" " "	7210
Summit of Mount Longonot: highest pinnacle on west edge of crater	" " "	9350
Edge of crater on east side of Mount Longonot	" " "	8600
Lake Naivasha	" Naivasha basin	6200
Ford over the Guaso Murendat	" " "	6330
Ford over the Guaso Gilgil	" " "	6400
Summit of ridge separating Elmetaita and Naivasha basins	Rift valley	6710
Camp by Kariandusi river	" Elmetaita basin	6140
"Kilima Meza" (*Alpine Journ.*, vol. xvii. 1894, p. 91)	" " "	7650
Lake Elmetaita	" " "	5880
Camp (No. 45) at Mali M'baruk	" " "	6280
Camp (No. 46) by Guaso Nagut	" " "	6600
Ridge separating Elmetaita and Miviruni basins	" " "	6730
Second camp (No. 48) in Miviruni	" Miviruni basin	5550
Summit of "Equator Peak"	" " "	6150
Shore of Zewi Kibibi	" Kibibi	4860
Edge of plateau above south end of Lake Losuguta	" "	5030
Shore of Lake Losuguta	" Losuguta basin	3050
Njemps Ndogo	" Baringo basin	3320
Njemps Mkuba	" " "	3310
Swamp of Guaso Nyuki, east of Njemps	" " "	3250
Lake Baringo	" " "	3200
Old Lake terrace on east side of Baringo	" " "	3230
Lobat pass	" " "	3310
Ridge separating Baringo and Usuk basins	" " "	3600
Camp (No. 61) by ford across G. Tigirish	" Foothills of Kamasia	3470
First plateau	" " "	3650
Second (or basalt) plateau	" " "	4080
Col east of Swahili camp, Mkuyuni: valley of Kamnye river	" " "	4480
Camp (No. 63) west of Mkuyuni	" " "	4860
Summit of ridge east of Doenyo Lubikwe	Kamasia	6100
Plateau of Kamasia (R.S. = 6800. Revised from Railway Survey)	"	6630
Pass of Larabwal	" Foothills of Laikipia	4430
Camp (No. 65) at Lanjoro Larabwal	" " "	4330
Camp on Guaso el Narua: south end of Larabwal	" " "	4630
Camp above source of Guaso el Narua, near edge of Gopo lal Mwaru	Laikipia	6030
Alug'aria: camp No. 68	"	6100

Locality.	District.	Alt. in feet.
Pass across Subugu (the "Marmanettberge" of Höhnel)	Laikipia	6950
Camp (No. 69) at Lari lal Morjo	„	6480
Camp (No. 70) beside Guaso Narok	„	6450
Camp (No. 71) beside north branch of Guaso Laschau	„	6740
South branch of Guaso Laschau	„	6710
Camp (No. 72) at Rangatan Ndare	„	6720
Telphusa swamp	„	6610
Camp (No. 73) beside Guaso Nairotia	„	6720
Ford across Guaso Rangatan Nado	„	6780
Ford across second branch of Guaso Rangatan Nado	„	6675
Masai kraals to south of Guaso Rangatan Nado	„	6710
Ford across Guaso Narol Gwinia	„	6610
Steppes south of Narol Gwinia	„	6780
Guaso Nyuri	„	6360
Second branch of Guaso Nyuri	„	6470
Camp (No 75) by Doenyo Songari	„	6150
Guaso Nairobi	„	5950
Camp on steppes north of Guaso Thegu	„	6240
Ford across Guaso Thegu in gorge by camp	„	6000
Teleki's camp at Ndoro	„	6590
My camp at Ndoro beside Guaso Mairi	„	7100
Lower boundary of bamboo zone, west slope of Kenya	Mount Kenya	8170
Upper boundary of bamboo zone, west slope of Kenya	„ „	9800
Upper boundary of forest	„ „	10100
Camp (No. 82) above site of old ice-fall	„ „	11500
Camp (No. 83) among agglomerate crags above Höhnel valley	„ „	13200
Teleki's Boma, in Teleki valley	„ „	13830
Snout of Lewis glacier	„ „	15580
Lake Höhnel	„ „	13980
Mount Höhnel	„ „	15800
Two Tarn col	„ „	15720
Camp (No. 84) in Teleki valley	„ „	13900
Ford over Guaso Thegu used on route from Njemps	North-east Kikuyu	5780
Ford over Guaso Thegu used on route from Ndoro	„ „	6000
Camp by Guaso Thagana (No. 76)	„ „	5950
Ford across Guaso Thagana	„ „	5850
Camp (No. 87) at Karati	„ „	5730
Frontier stream: Guaso Rerù	„ „	5700
Guaso Uiñi	„ „	5720
Ridge west of hill of Geitaita	„ „	5900
Camp by old lake basin at Hombé	„ „	5830
Camp at Kithungulu	„ „	5440
Camp at Thiriati	„ „	4330
Bottom of main escarpment below Thiriati	„ „	4060
Kithu-Uri, in Maranga	„ „	3900
Summit of hill at Maranga	„ „	3960
Stream at foot of hill	„ „	3740
Camp at Marungu: on lava plains of Tana	Valley of Tana	3630
Ford over Kiloluma or upper Tana	„ „	3350
Central col across ridge of Voroni	Valley of Thika-thika	4100
River on north side of Voroni	„ „	3630
Camp (No. 96) to west of lower falls of Thika-thika	„ „	3960
Upper falls of Thika-thika	„ „	4520
Upper steppes of Thika-thika: point where we crossed river	„ „	4680

NOTE ON DR. GREGORY'S MAP.—Dr. Gregory's sketches are based upon compass-s and an estimate of distances. They have been adjusted to the Mombasa y survey, and to Lieut. von Höhnel's surveys whilst attached to the expe- of Count Teleki and Mr. Chanler.

following corrections should be made on the Map, which was issued with ober number: Delete *Doenyo Gelesha* and the *altitudes* on Laikipia. ct the following altitudes:—

Lake	, *for* 3300 *read* 3200	Longonot,	*for*	8,700	*read*	9,350
Equ	, „ 6300 „ 6150	Jabe Hill,	„	8,500	„	8,200
Lak	a, „ 6350 „ 6200	Kenya,	„	18,370	„	19,000

the following place-names:—

nt	*read* Mau Scarp.	*For* Tuni	*read*	Juni.
ti	„ Rangata Nyuki.	„ Loet Divis	„	Loel Divis.
„	„ Lesuria.	„ Elmenticita	„	Elmetaita.

DAL GLACIER-LAKE,

By Captain A. F. MOCKLER-FERRYMAN.

eculiarity of this lake lies in the fact that it is one of the few n instances of a glacier in a main valley descending across the of an adjacent valley, and thus damming up the tributary stream form a lake. Although it is evident, from the name given to the Amt Kart (viz. Dam Lake), that its nature has been long n to the Norwegians, yet previous to 1892, when Dr. Robert ro visited the neighbourhood,* the lake had received little attention, and, even at the present time, I am unaware that any geologist has examined its formation. Dr. Munro unfortunately arrived at the glacier too late in the day to be able to make the attempt to reach the so-called "pond-lakes" † (Dæmme Vand), and was forced to content himself with the descriptions supplied by trustworthy natives.

Being much interested in the subject, and finding myself, this summer, within a few miles of the glacier, I took the opportunity of paying a visit to the locality, and inspecting the "pond-lakes." Before, however, describing them, a few details relating to the geography and history of the neighbourhood may not be out of place.

At the head of the Hardanger fjord lies the Eid fjord, into which flow two rushing mountain rivers, the one entering the fjord at Vik (Eid fjord), the other—a few miles to the north—at Simodal. These rivers bring down the melted snows from the vast plateau of Hardanger

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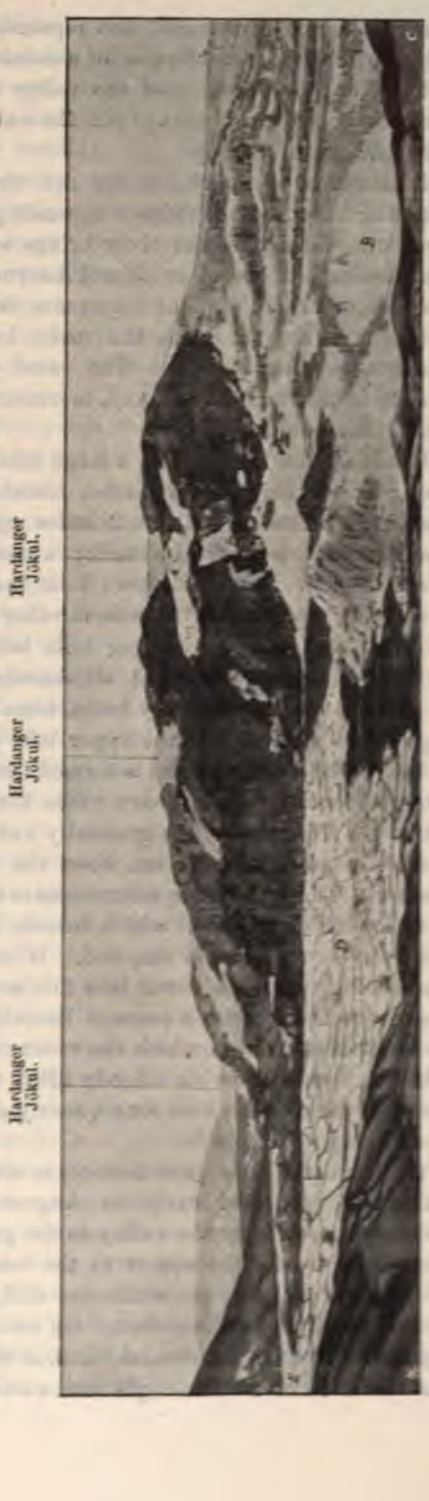
* Royal Society of Edinburgh, "On a Remarkable Glacier-Lake, formed by a Branch of the Hardanger-Jökul, near Eid fjord, Norway," by Robert Munro, M.D., M.A. *Read March* 20, 1893.

† The term "pond-lakes," used by Dr. Munro, is somewhat erroneous. The author of it was a worthy Norwegian, who, when asked to translate "Dæmme Vand," referred to a dictionary, where he found "water contained by a dam," "a pond."

Vidden, and, in the early summer months, are swollen torrents. Both flow through valleys hemmed in by stupendous mountains, and terminating in precipitous cliffs in the shape of the letter U, over the edge of which tumble magnificent waterfalls. With the Vik river we need not concern ourselves; suffice it to say that, some 10 miles from its mouth, it forms one of the grandest waterfalls in Norway, viz. the Vöringfos, which alone is worth many miles of travel to see.

The Simodal is a picturesque and well-cultivated valley, at the extreme end of which issues, between rocky walls, the great Rembesdalfos, a waterfall containing at all seasons a volume of water sufficient to form the wide and swift torrent which flows down the valley. A few feet above the river-banks stand the farms, surrounded by their small patches of cultivation, which, for facility of irrigation, descend almost to the water's edge. Two bridges span the river, the one of light construction, and the other a well-built pile-bridge,



A = Rembesdal glacier.
B = Where tunnel through glacier, 1893.
C = Base of Lure Nut (site of proposed tunnel).
D = Floating pack-ice.
E = Position of waterfall from upper to lower lake when lower lake empty.
F = Detached ice from glacier.
E G = Upper lake } both one lake (Dæmme Vand) at this season.
E F = Lower lake }
H to *C* = Base of Lure Nut.

PANORAMA OF THE DÆMME VAND REGION.

the property of the Government, but repairable by the inhabitants of the district; while a good road runs for a considerable distance on either side of the river. The scenery of the valley is wild and romantic, but similar in most respects to that of all the valleys which run down to the fjords of Western Norway.

The inhabitants of Simodalen are not numerous—perhaps 100 all told—but their means of livelihood depending entirely on their farm produce, an unusual rise in the river brings with it misfortune to the people, in the shape of loss of crops and destruction of property. That such floods are of not infrequent occurrence is well authenticated, and twice within the last six years the roads, bridges, and crops of the valley have been swept away. The cause of these periodical and sudden floods is not far to seek, and, moreover, has been known to the people from time immemorial.

The Rembesdalfos falls out of a large lake—the Rembesdal Vand—at the upper end of which lies a glacier, descending from the vast snow-field, Hardanger Jökulen. About 2 miles up the glacier, and almost at right angles to it, is situated a valley, across the mouth of which the glacier forms a dam. A stream flows from the north down this minor valley, receiving on its way numerous other streams of melted snow from the Jökul, and, the surrounding hills being high and precipitous, a small lake is formed, which, at all seasons, remains full of water. South of this upper lake is a rocky basin, some 150 feet below the level of the edge of the glacier. As the upper lake overflows, the water falls into this basin, and a second lake is formed, the glacier-dam effectually preventing any outlet. In ordinary years the snows melt slowly, and the water in the lower lake rises gradually until it reaches the level of the top of the edge of the glacier, when the two lakes appear as one sheet of water. The water then commences to escape between the glacier and the rocky hill (Lure Nut) which bounds it, cutting a channel for itself until the lower lake is emptied. When, however, the summer thaw is unusually rapid, the lower lake fills so suddenly that the weight of the pent-up waters forces a passage beneath the glacier, and a vast tunnel is excavated, through which the water rushes in one volume. As the Rembesdal Vand (below) is already filled to overflowing, it can do little to check the flood, which consequently sweeps onwards down the Simodal, carrying all before it.

Ascertaining that it was quite feasible to visit the Dæmme Vand from Vik in the day, I started early on August 6, and rowed across to the Simodal. The walk up the valley to the great waterfall took about three hours, and thence the ascent to the lake above was made by a weary climb, up an almost perpendicular cliff, aided by ropes fixed to the rocks and rough steps of boulders. On reaching the summit, I found myself by the side of the Rembesdal Vand, at the point where it narrows in to form the waterfall. The sight was a strange one: the deep-blue mountain lake, studded with numerous floating icebergs (detached from the glacier), lay nestling at the foot of the green hill-slopes, black granite boulders cropping up, here and there, among the surrounding verdure. A mile or more away in the distance, the glacier fell down into the lake —a streaked and fissured mass of ice. Skirting the edge of the Rembesdal Vand, I soon arrived at the glacier itself, and commenced to cross it, which I found no easy task. Deep crevasses stretched in all directions, and upwards of an hour was occupied in reaching the opposite side. From this point all was plain sailing, as there was nothing to be negotiated more difficult than the rocky precipices of Lure Nut, and a walk of two or three miles, on the snow, by the glacier-side.

In the early afternoon I was standing on the edge of the Dæmme Vand, and surveying the scene. The lakes were nearly full and formed one sheet of water, about 300 yards wide and a mile or so in length. At the northern end the floating masses of ice almost completely covered the surface of the water, while near the glacier the water was more open, though containing huge icebergs. On either side of the valley rise up lofty granite mountains, and across the centre of the lake juts out a low rocky headland, which, when the lower lake empties itself, stretches to the opposite bank, and confines the waters of the upper or northern lake. It was quite evident that, owing to the height of the mountains, there could be no means of escape for the water other than by way of the glacier, and, as far as I could judge, the lake had yet to rise another 10 or 15 feet before it would commence to overflow.

I was fortunate in having with me, as guide, a native of the valley, who was well acquainted with the locality, and who had visited the lake several years in succession, to ascertain for the farmers the state of the waters. Last year (1893) one of the periodical floods occurred, and my guide proceeded to the spot immediately after the disaster. He described the scene he witnessed as one of the most marvellous sights imaginable. The lower lake was completely empty, the bottom being strewn with boulders, amongst which stood huge piles of stranded icebergs. The tunnel in the side of the glacier was of immense proportions, and its smooth sides of the most glorious colouring. The water had passed through with one mighty rush, and had caused the river in the Simodal valley to rise some 50 feet above the normal. The result is still visible, roads for several hundreds of yards being entirely washed away, and the permanent bridge being in ruins.

The outlook this year is more hopeful. The water in the lake h risen gradually, and the tunnel appears to have refilled with suffici solidity to withstand the water; thus, in all probability, the lake w empty itself over the side of the glacier.

The inhabitants of the valley have invoked the aid of the Gove ment to assist them in preventing these periodical and devastating floo and skilled engineers have inspected the site of the evil. At first it w

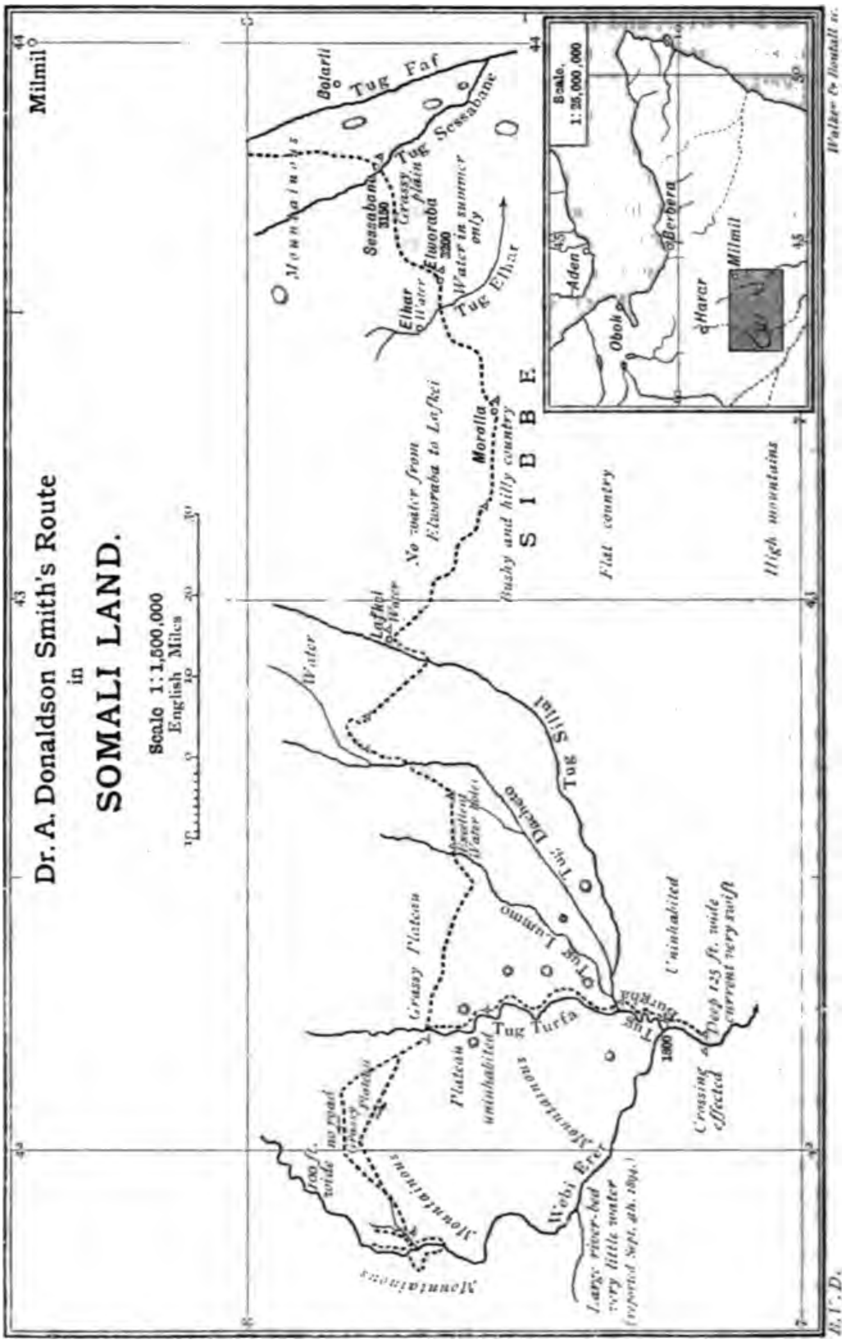
proposed to form a dam, at the top of the Rembesdalfos, so that the Rembesdal Vand should hold the superfluous water from the Dæmme Vand, when a sudden discharge took place. On mature consideration, however, it was feared that it would be impossible to build a dam of sufficient strength to withstand the sudden rush and weight of water, and, were this artificial dam to give way, the floods in the valley would be even more severe than they have hitherto been. It has now, therefore, been finally decided to construct a tunnel, some 50 yards in length, at such a level that it will carry off the water of the Dæmme Vand before it rises to any great height. The cost will be considerable, as the tunnel will be made through the solid rock at the base of Lure Nut, by the edge of the glacier, and its mouth is to be provided with iron doors, to prevent its becoming blocked with ice and snow before the thaws set in each year. It is to be hoped that, when the work is completed, the desired end will be attained, and the unfortunate inhabitants of Simodalen saved from further disasters.

DR. DONALDSON SMITH'S EXPEDITION IN SOMALILAND.

The following letter has been received at the Society from Dr. Donaldson Smith, who, it will be remembered, started on an expedition across Somaliland to Lake Rudolf, in May last. The letter is dated "Webi Shebeli (or Webi Erer?), lat. 7° 11′ N., long. 42° 11′ 23″ E., September 1–3."

"I have happened on two very wild-looking men, who lead a precarious sort of an existence in this otherwise uninhabited country, collecting gum and shooting game with poisoned arrows. I am offering them heavy bribes to take letters to the coast. They accept, but will not wait long, so I must send you only a very rough and hasty copy of my map. There are many reasons for my not having gone further. I lost many camels the first month, and had to move very slowly with heavy loads; then the trading poor camels for good fresh ones, and buying a lot of additional ones, took some time. I was determined to push as much westwards, after leaving Milmil, as possible, and this brought me almost at once into unexplored country, very rough and bushy. The guides misled me every now and then through ignorance themselves of the country. The men were obliged to do much chopping in places to make a path, notably, from Lafeik to Turfa, and on the march from Turfa to the Erer river.

"I am satisfied with my journey so far. All the poor camels have been got rid of, and to-day we have 110 splendid animals in the best condition. From Turfa I had hoped to continue west and across the Erer river, but it is impossible either to donkeys or camels. In some places the mountains rise so precipitously from the water's edge that a man cannot climb down. The stream is from 1 to 3 feet deep and


Dr. A. Donaldson Smith's Route
in
SOMALI LAND.
Scale 1:1,500,000
English Miles
0
10
20
30
43
44
8
7
Milmil
Bolarli
Tug Faf
Tug Sessabane
Sessabane
3150
Grassy plain
Mountainous
Elworaba
3350
Water in summer only
Elhar
Water
Tug Elhar
No water from Elworaba to Lafkei
Morolla
Bushy and hilly country
S I D B E
Flat country
High mountains
Lafkei
Water
Water
Tug Sillul
Tug Dacheto
Excellent Water holes
Grassy Plateau
Tug Lummo
Uninhabited
Deep 125 ft. wide current very swift
Tug Burkha
1800
Tug Turfa
Plateau uninhabited
Mountainous
Crossing effected
Webi Erer
Large river-bed very little water (reported Sept. 4th 1894.)
100 ft. wide
no road
Mountainous
Mountainous
Scale 1:25,000,000
Aden
Obok
Berbera
Harar
Milmil
45
10
E.V.D.
Walker & Boutall sc.

)

100 feet wide, and the current about 3½ miles per hour. I made a trip of seven days to and from camp at Turfa, and explored the Erer for about 30 miles. If you will notice on the little map I send, I make the Erer very much further west than is commonly supposed; it makes a great curve running south-west, south, and then south-east. I have done much work in trying to map the course of the river-beds Sillul, Dacheto, Lummo, and Turfa, and getting correct names, and I believe I have succeeded. One common fault in Somaliland is to confound some one spot on a tug with the tug itself. We spent two days trying to cross the river 4½ miles above the present position, but the current was too swift for ropes or raft. We then tried lower down, and after two days' hard work we are at last across, not without the loss of one of my poor boys; the current carried him away, and he was drowned. The current is 4½ miles an hour here, and from the volume of water, I have no doubt that a large stream empties itself into the Erer between the point at which I met the Erer on my side trip from Turfa and here. This stream is evidently as large as the Erer, but no larger. Whether it may be called the Webi Shebeli or not is a question, but certain it is that the Erer contributes towards making half of the large river that is called Shebeli at Irne.

"The country for many miles along these rivers is uninhabited, on account of the feuds between the Gallas and the Ogadams. Game is abundant. While marching across an opening in the bushes, a rhinoceros suddenly sprang up and charged down upon us. I had begun to hold the rhino in contempt, so I merely stepped aside a couple of yards to get a side shot, thinking that he would continue in a straight line. He turned as quickly as a cat on me, however, and I could not dodge him. I just had time to raise my eight-bore and fire at his head, when he was 4 feet from me. He dropped on his knees, but in an instant was at me again, this time with his head lowered. I dropped him, and there was little kicking. He lay dead only two feet from me, and I became a wiser man. Mr. Gillett had good sport with a lion a few days ago. Gillett has had excellent sport all along with antelopes, zebras, rhino, etc.

"This country is full of interest. There is the greatest variety of flora and fauna, and what with mapping and collecting I have my hands full. E. Dodson, taxidermist, is a valuable assistant. I already have a large collection. Fossil shells and coral are to be found all over the hills. It is very often cloudy, and there are occasional showers. This is the hottest place I have been in since I left Berbera—average for twenty-four hours, 88°. On the highest plateau lands to the east, my observations often show a mean temperature of 71° to 75°. We are all three in excellent condition. I have seen one or two flies that I believe to be the dreaded camel-fly of the Webi Shebeli, but they are very rare. I am at present most anxious to find a guide. There is not a trace of any man ever having been here. I am obliged, therefore, to send men in all directions to find the best place for camels to march, and to try to find water to the west. I shall endeavour to solve the question of the Webi Shebeli and the Erer by going myself up the river, on which we are camped. The confluence of the two streams must be necessarily close to us. My men are doing splendidly. We shall probably spend a longer time in Africa than I at first anticipated. We have had no mishaps so far, except the drowning of the camel boy and the capture of a mule by a crocodile.

"*September* 2.—My reconnoitring parties have just captured two Gallas. They are still a little frightened, but they unite in describing a river only about 20 miles above our camps which joins the Erer, and which comes from the north-west. I shall soon see this river, and follow along it if possible. Our two captives also tell us of many villages near us, where camels, donkeys, and sheep can be bought. They point out that the Gallas, who are called after Sheik Nussein, lie to our south-west. The Gallas will hardly credit their senses when they find we have crossed the river at this time of year, when it is so full, and at this difficult point.

"*September* 3.—A party of eight of my men I sent out the night before last have just returned, with the news that they found a large river-bed coming into the Erer, 25 miles above our camp. There was scarcely any water in it, and in places it was altogether dry. The news is reliable, as the men knew I should see for myself in a day or two; the only thing to doubt is the exact position, as the Somalis are bad judges of distances. Now I feel certain, however, that this is the Erer I am on, and that no stream of importance empties itself into it before it changes its name into Webi Shebeli at Irne. The large volume of water before our camp may be accounted for by rains to the north-east."

THE PEARY AUXILIARY EXPEDITION, 1894.

THE following letter has been received by the President from Mr. Henry G. Bryant, in charge of the Peary Auxiliary Expedition, sent out under the auspices of the Geographical Club of Philadelphia:—

"Almost a month has passed since the good ship *Falcon* landed the members of the Peary Auxiliary Expedition and the returning members of Lieutenant Peary's party here in Philadelphia. Knowing of your interest in Arctic questions, I hoped ere this to have sent you a letter supplementing, in a measure, the information sent to the newspapers by cable from St. John's. An accumulation of work and engagements of various kinds have thus far interfered with the performance of this pleasant duty.

"In this year of Arctic disappointments, I look back with some satisfaction on the record of the Peary Auxiliary Expedition. In a season of unusual severity, we succeeded in reaching the Peary headquarters, and brought back the returning members of the party in safety. By landing and making a careful search at Cary Islands, Cape Faraday, Clarence Head, north shore of Jones Sound, and Northumberland Island, we established the melancholy fact that Björling and Kallestenius never succeeded in reaching the western mainland.

"The *personnel* of our party was exceptionally good, and included among others—as geographer, Professor Wm. Libbey, Junr., a Fellow of your Society, and the successor of Guyot in the chair of Physical Geography at Princetown University; as geologist, Prof. T. C. Chamberlin, perhaps the foremost authority on glaciation in the United States. As you know, we sailed from Brooklyn, N.Y., on June 20, and subsequently from St. John's on July 7. The 1300 miles' run to Godhavn, Disko, was made without special incident, and, leaving there on July 17, we entered Melville Bay on the 20th. Here we met much heavy ice, and Captain Bartlett, after essaying the middle passage, was obliged to retreat to the south-east. We then followed the 'Inner Run' of the whalers, and, butting the ice continually, arrived off Cape York on the morning of July 22. Here the *Falcon* was beset with an uncomfortable list of 9° to the starboard for thirty-nine hours. After a brief stop at Cape York, we proceeded to the Cary Islands, and landed on the south-eastern member of the group. No sign of the *Ripple* could be found; but the retreating snow revealed the site of Björling's last camp, where, scattered about in confusion, numerous memorials of the brave but foolhardy adventurers could be seen. A silver watch, zoological note-book, botanical press, and a few other articles, were selected from the mass of relics. A careful search of the island resulted in the finding of no additional record, but revealed the fact that the grave of the man who had died there had been despoiled by the burgomaster gulls of the island. A feeling of compassion filled our hearts as we viewed the scene of this grievous struggle against fearful odds. The dismembered bones of the ill-fated voyager (evidently a sailor) were collected, and a new grave made for them, and afterwards—in the arctic stillness, and under the light of the midnight sun—a simple burial service was read over the grave of this poor wanderer, and a headboard erected over his grave; after which we left the island, and, turning our faces northward, invoked better tides and fortunes for ourselves and friends at Anniversary Lodge.

"On July 25 we reached the neighbourhood of Lieut. Peary's head-quarters, only to find that the ice had not yet broken up in Inglefield Gulf, and that 35 miles yet intervened between us and our destination. In company with Mr. Diebitsch and two Eskimos, I attempted to reach the Peary head-quarters by making a sledge-journey to the head of McCormick Bay, and thence by a trail across the ice cap to the head of Boudoin Bay. After an absence of four days, during which we encountered fog and storms and baffling 'leads' of open water, our native guide refused to proceed any further, and we were compelled to return to the ship. Communication was finally opened up with the Peary party on August 1, and the same day a party of us delivered the mail at Anniversary Lodge.

"Great was our regret to learn of the failure of Mr. Peary's plans, and the necessity to postpone their execution until the following year. From dispatches cabled to Europe, you are doubtless familiar with the causes for the miscarriage of his well-matured plans, and I will, therefore, only add a few lines concerning our quest for the Swedes in Ellesmere Land. On August 4 the *Falcon* was headed to the west, and after thirty-six hours' struggle with the ice, the open water of Baffin Bay was reached. Great quantities of field-ice were found obstructing the approach to the west shore; but on August 7 we succeeded in landing at Cape Faraday. No traces of the lost explorers were found here, nor at Clarence Head, where a landing was effected on the 7th. Records were deposited in cairns at both places, and on leaving these desolate shores for Jones Sound we felt convinced that these brave young men had met their death in that final boat-journey undertaken on October 12, 1892. Had the unfortunate travellers landed in Ellesmere Land, their fate would have been sealed. The entire coastline consists of a succession of precipitous headlands crowned by the changeless snow-cap, which discharges by numerous glaciers into the sea. No traces of game or of the recent presence of Eskimo were found, although a few ancient graves were observed near Cape Faraday.

"The examination of Jones Sound, with all its possibilities of original geographical research, was now before us. Finding Glacier Strait ice-band, we made our course through the pack-ice south of Cobourg Island into the sound. The dictum of the whaling captains, that this west coast is unapproachable during ten months of the year owing to the field-ice, which extends 20 miles from shore, seemed to be verified by the experiences of our party. For six hours after passing Cobourg Island we steamed onward through open water, and hopes ran high of soon reaching new lands beyond Inglefield's farthest of 1852. But the formidable, unbroken line of last winter's ice presently rose up ahead of us, presenting an impassable barrier across the sound. It was indeed a disappointment to be turned back thus on the threshold of the unknown; but, with no prospect of changed conditions and with definite responsibilities ahead of us, protracted delay in these inland waters seemed unwarranted, and so, after reaching a point somewhat west of lat. 76° 15′, long. 81° 54′ 58″, and delaying only long enough to land on the north shore near Cone Island, we made our way out of the sound and headed for Northumberland Island, where we arrived on August 13. Björling, in his record dated October 12, stated that after

the wreck of the *Ripple* he tried to reach Foulke Fiord to winter there, 'but, after reaching Northumberland Island, was compelled, from several causes, to give up this voyage and return to Cary Island.' Thinking that possibly some traces of the presence of the Swedes might be found on this island, we skirted the south shore and landed at one point; but nothing was found to throw any further light on their movements. You are doubtless acquainted with the subsequent movements of our party until we arrived in Philadelphia on September 25. It only remains for me to express my sincere regret that the outcome of the search for the young explorers was of such a negative character. Their lofty courage deserved a better fate. The relics obtained on the Cary Islands were turned over to Dr. Ohlin, who availed himself of the invitation of Inspector Anderson, of Godhavn, to take passage to Copenhagen on one of the vessels of the Royal Greenland Trading Company. I will take pleasure in forwarding to you a few photographs taken at the Cary Islands.

"The probable loss of the *Falcon* with all hands on her return to St. John's comes home to me with inexpressible regret. The good ship sailed from here on October 3, with a cargo of anthracite coal. Heavily loaded as she was, a quantity of coal being on her decks, I fear she ran into the hurricane which raged off the island of Saint Pierre on August 9 and 11."

OUR COMMERCIAL RELATIONS WITH CHINESE MANCHURIA.*

By A. R. AGASSIZ, of the Imperial Chinese Customs, Shanghai.

PART I.

INTRODUCTION.

Before entering upon an inquiry into the history, the politics, or the commerce of a country, it is often advisable to turn to an atlas, and so refresh one's memory as to the salient features of the country's geography. With Manchuria this is more than ordinarily necessary, as its true importance is little recognized in Great Britain. When a good map is consulted, all the knowledge necessary for the present purpose may be acquired by scanning it for a few minutes. Some difficulty may certainly arise in finding a reliable map, unless the seeker knows exactly where to look for it. Good maps of Manchuria do exist, and that accompanying Mr. H. E. M. James's work, 'The Long White Mountain,' is notably so. Then, too, the naming of the towns, rivers, etc., is at first rather puzzling, as two names are frequently given. The first is the Manchu name, generally used by Europeans; the second, that in common use among the inhabitants, is Chinese. One river has no less than three names, as it is not only known by its Manchu name, Saghalien, and its Chinese name, Hei-lung-chiang (Black Dragon River), but is also called the Amur. This river forms the northern boundary of Manchuria, separating it from Siberia. The other boundaries are—on the south, the Gulf of Lao-tung, and the rivers Tumen or Kaoli-chiang and Yalu or Ai-chiang, separating it from Korea; on the east, the Russian Primorsk, from which it is in part separated by the Usuri river; and on the west, the vast plains of Chinese Mongolia. Within these boundaries an area of about 280,000 square miles is enclosed, making Manchuria rather larger than Afghanistan, a country it resembles both in geographical features and the political importance of its situation.

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* There has unavoidably been a year's delay in publishing this paper, which will account for the date of some of the statistics, but the value of the paper is not affected.

Most of the rivers of Manchuria, not excepting the Sungari or Sung-hua-chiang, the largest of them all, a tributary of the Amur, rise in the south-eastern part of the country, which is very mountainous, one mountain, the Shan-alin or Chang-pai shan (Long White Mountain), attaining an elevation of 8000 feet. All but two have been named already when describing the boundaries. The first is the Nonni, the chief tributary of the Sungari; the second, the Liao-ho, having near its mouth the important port of Ying-tzu.

For administrative purposes, the country, like Cæsar's Gaul, is divided into three parts, hence the Chinese name, Tung-san-sheng (the Three Eastern Provinces). They are—Liao-tung or Feng-tien, in the south, with the ancient city of Mukden or Shen-yang for its capital; Kirin, chief town Kirin or Chuen-chang, in the centre; and Hei-lung-chiang, with Tsitsihar or Pu-kwei as the seat of provincial government, in the north.

Some other towns, in addition to the three provincial capitals, deserve notice, more especially Ying-tzu, Lu-shun-ku, San-sing, Hun-chun, Kuan-cheng-tzu, and Feng-hwang-cheng. The first named, which, as already stated, is near the mouth of the Liao river, is usually called Newchwang, by Europeans; but this is a mistake, as the town of Newchwang is about 30 miles higher up the river. Newchwang was at one time a port, but the gradual silting up of the river has for years prevented seagoing junks from ascending so far. Midway between Ying-tzu and Newchwang is a place called Tien-chwang-tai, at which, so late as 1873, junks managed to discharge cargoes; but no foreign vessel has ever been higher than Ying-tzu, and Ying-tzu was the place meant by Lord Elgin when he drew up the treaty of 1858, although the name of the old port was inserted. So, as I shall have no further occasion to refer to Newchwang proper, I shall, in conformity with custom, in future speak of Ying-tzu as Newchwang.

The town, a rapidly increasing place, contains upwards of 60,000 inhabitants. It is situated about 8 miles from the mouth of the river, on the left bank. Opposite to the town the river is about 500 yards wide, and as entrance from the sea is rendered somewhat difficult by a bar, a light-ship and other aids to navigation have been placed to facilitate ingress and egress. A mud wall about 5 miles long, built by public subscription, finished in 1869, bounds three sides of the city, which fronts the river. As Newchwang is a treaty-port, or place at which foreigners are allowed to reside permanently, it has a small European population numbering, children included, about 80 persons.

Lu-shun-ku, more commonly called Port Arthur, is a naval port, chief rendezvous of the Chinese northern fleet, situated near the end of the Kwan-tung peninsula. It has an excellent harbour and some docks, recently constructed for the Government by a French syndicate.

San-sing is deserving of notice as being the centre of the grain trade carried on with the Russians residing at Khabarofka, the capital of Primorsk. Transport is conducted by means of boats, viâ the Sungari, the river on which San-sing stands, and the Amur.

Hun-chun is an important town from a military as well as commercial aspect. It stands on the left bank of the Tumen, not far from where that river enters the sea, and is consequently in proximity to the Russian and Korean frontiers. Only 30 miles distant is Possiet harbour, belonging to Russia, and within a few hours steam of Vladivostok. The name of this latter port indicates the position the Russians hope it will some day hold among the cities of Asia. It means, according to Mr. George Dobson, author of 'Russia's Railway Advance into Central Asia,' mastery over the East.

Kuan-cheng-tzu is a prosperous business place, situated near the Mongolian border, about 200 miles, in a northerly direction, from Mukden.

Feng-hwang-cheng, once, in a small way, the Novgorod of this part of Asia, is a town on the Korean frontier, rather more than 100 miles to the eastward of Newchwang, at which, prior to the year 1876, an annual fair was held, resorted to by Korean and Chinese traders in great numbers. Goods of foreign origin were not at that time allowed into Korea, but, it is said, when packed in Chinese style, were often sold in large quantities to the Koreans, as Chinese productions. About 1874 this rule seems to have been relaxed somewhat, as Korean traders were seen buying European goods in the Newchwang market; and two years later, the port of Fusan, on the east coast of Korea, was opened to foreign trade. What the value of the frontier trade was it is hard to say, as no statistics exist, but Mr. Mann, Commissioner of Customs, in his report on the trade of Newchwang for 1874, states that the value of the piece goods, chiefly white and grey shirtings, disposed of during that year to the Koreans was a little over 210,000 taels. This sum, at the then existing rate of exchange, would be equal to £70,000 sterling. Fairs on a similar but smaller scale were also held at two other frontier towns, Kao-le-men and Taku-shan.

In the treaty signed by Korea and Japan in 1876, before opening Fusan, no mention is made of any privilege, to be enjoyed by the Japanese, of trading in European goods; but, on the contrary, in the supplementary treaty, signed in the same year, it is distinctly laid down (Article IV.) that Japanese subjects are to have full liberty either to buy articles of local (*i.e.* Korean) production or to sell articles of Japanese production. There can, however, be no doubt that Fusan, during the years that intervened between its opening and the opening of the other Korean ports, acted, so far as the admission of European goods is concerned, as a back door to Korea. For so soon after the opening of Fusan as the end of the year 1877, Mr. Vignier, then in charge of the customs at the port of Newchwang, said, in a report of the trade of that port for the year just finished, that one of the causes of a falling off that had taken place in the importation of drills and sheetings was because "native importers have ceased to order goods for the Korean market, having lost all confidence in Korean buyers, who have not kept their contracts and engagements so faithfully since they have been able to receive their supply direct from Japan."

Of the history of Manchuria not much can be said in so small a space as I have to devote to it, as it is a subject that, to be treated properly, would require a number of volumes, and volumes that could only be written after translating an untold quantity of Manchurian, Chinese, and even Korean books. But to obtain such information as is at present essential, it is not necessary to go to this length, as the works of the Rev. John Ross, author of 'The Manchus,' who has obtained most of his information from native sources, give an excellent account of the only period of Manchurian history that has any direct bearing on our subject. This epoch is distinguished from all others in that the great event of its time has influenced the history of the rest of the civilized world. I allude, of course, to the Manchurian conquest of China.

Some time prior to this event, which may be said to have taken place in

A.D. 1644, as it was in that year that Peking was taken, although the subjugation of the whole country was not completed till some years later, the various petty tribes into which the Manchus were divided, who were continually at war with one another and with their Chinese and Korean neighbours, had been united under one chief, named Norhachu. This man, born in 1559, was both an able commander and a capable organizer and administrator. He found his country in a state not unlike the condition of Scotland after James I. had ascended the English throne. For, while the province of Liao-tung, the Lowlands of Manchuria, acknowledged the sovereignty of the ruler of the neighbouring empire, the other provinces, which may not inaptly be styled the Highlands, were inhabited by people divided into a number of clans, who really cared for no authority but that of their own chieftains. One of these chiefs, Norhachu's grandfather, was slain in 1583, together with his son, Norhachu's father, in a war against a neighbouring clan, and Norchachu, at the early age of twenty-four, found himself called upon to take the reins of government. He was so successful, both as a general and diplomatist, that in a few years he not only, as already stated, made himself master of the whole of the country then belonging to the Manchus, but he succeeded in expelling the Chinese from Liao-tung, and annexed that province. At his death in 1626, he left, instead of the petty chieftainship he inherited, a kingdom as large as the Austro-Hungarian empire. His successor, his son Tai-tsung, lost no opportunity of consolidating these possessions and strengthening his position. The Koreans, his neighbours, who had, by uniting with the Chinese when Norhachu was at war with the latter, been a source of great annoyance to the Manchus, were attacked when a favourable opportunity offered itself—that is, as soon as the Chinese had their attention turned to other matters and were unable to assist them—and the whole peninsula overrun. The northern provinces of China, Pechili and Shan-tung, were continually laid waste by raiding parties, and Peking itself, then the largest city in the world, was upon one occasion besieged. Tai-tsung died in 1643, and his son Shun-chih, a boy of some five years of age, succeeded him. A regent, on account of Shun-chih's youth, had to be selected, and the choice fell on one Dorgun, the king's uncle, who had hardly stepped into his new position when an opportunity, invaluable to such a man, for he appears to have possessed the qualities of a Talleyrand united to those of a Napoleon, presented itself in the form of an invitation from the general commanding the Chinese forces stationed on the Manchurian frontier, to co-operate in an attempt to restore order in China. This invitation, seeing that Peking was at this time in the hands of a rebel, and the emperor had committed suicide, had not long to wait for an answer. It received one, delivered by Dorgun in person at the head of his army; and as soon as the forces were united, a march was begun upon Peking, from which city the rebel leader then in possession fled, laden with a rich booty, so soon as he heard of the approach of the allies. Dorgun, therefore, entered Peking unopposed, and immediately set about restoring order. In this laudable pursuit he was assisted by his soldiers, whose number was daily being increased by fresh arrivals from Manchuria, while the Chinese army in the capital was greatly reduced by sending a large contingent after the retreating rebels. When quiet prevailed, Dorgun was requested to accept some remuneration for his services and return to his country; but, as might have been expected, seeing the Chinese had no power to enforce compliance, he declined, and not only declined, but, thinking a time had come when all disguise could safely be thrown off, he openly proclaimed his nephew, Shun-chih, Emperor of China.

Mr. Hugh Murray, in his 'Historical and Descriptive Account of China,' published in 1836, says of the Manchus, at the time they took Peking, "They are said to have had at this time no supreme ruler, the executive power being divided among a number of chiefs. But, on viewing themselves as masters of so vast a dominion, they judged it proper to name a sovereign, though by electing a youth only seven years old, they retained in their own hands all real authority;"—a statement that does not agree with Chinese records, and, although perhaps expressing a popular idea, is erroneous.

The new dynasty was not recognized in the southern provinces till some degree of force had been displayed, but the change, so far as the northern parts of China were concerned, was accepted passively, if indeed not joyfully. That it has proved beneficial to China and to all those nations desiring peaceful commercial intercourse with her cannot, I think, be questioned. So long ago as the year 1646, the Russians, under the leadership of Khabaroff, made an attempt to obtain a footing south of the Amur, which resulted in a thirty years' war with China; and, in spite of treaties, at a later date they annexed the Maritime Province, a part of Manchuria. So it is more than probable that, if the Manchus alone, brave as they are, had been obliged to resist these Muscovite attacks, unsupported by China, the whole of their country would ere this have fallen into the hands of Russia.

The population of Manchuria is said to be about ten millions. Almost all are Chinese or of mixed extraction, as what with the army that left the country with Dorgun, those who followed shortly after him, and the continual draining off of the young men for service in the Tatar guard at Peking, the country has been gradually evacuated by the Manchus, while, on the other hand, its fertile lands have constantly, since the government of the country became settled, been attracting Chinese agriculturists from across the border. Whether the Manchus belong to the same race ethnologically as the Chinese, seems to be a matter admitting of some difference of opinion. If the structure of a language can be taken as indicating the origin of those who speak it, it appears that the Manchus come of a different stock to the Chinese. But Dr. Edward B. Tylor, author of 'Anthropology,' is of opinion that the general appearance and structural characteristics of the race are better indications of their origin than can be obtained by tracing the derivation of words made use of by them. He says, "In the middle and north of Asia, on the steppes and among the swamps and forests of the bleak north, wandering hordes of hunters or herdsmen show the squat-built, brown-yellow Tatar or Mongolian type, and speak languages of one family, such as Manchu and Mongolian." And later, in the same work, he says, "The dense population of South-East Asia, comprising the Burmese, Siamese, and especially the Chinese, shows a type of complexion and feature plainly related to the Tatar or Mongolian, but the general character of their language is different."

It seems, therefore, that most of the inhabitants of Asia living east of the Himalayas, including the Manchus, and not a few people living to the west of those mountains, in some cases even in Europe, have a common ancestry, difference in language notwithstanding, and all that is wanted is a really comprehensive name for the race. Not that at present there is no name; on the contrary, there are three, but none of them can be used except in a restricted sense. The names in use are Mongolian, Tatar, and Turanian. There are strong objections to the first and third. Dr. S. Wells Williams, author of a well-known work on China, 'The Middle Kingdom,' says, "No such word as Tartar is now known among the people, and the use in European books of Tartars and Tartary should be discontinued." In this Dr. Williams is right, and the use of the word "Tatary" has been discontinued; but there seems to be no escape from the use of "Tatars" as a race-name, no one having yet undertaken to supply a better word.

Facilities for transport do not exist in Manchuria to the extent desirable; in fact, in this matter this province is behind most of the other parts of the empire. In China the common method of conveying goods is by boat, if boating is practicable, and possessing such magnificent rivers, navigable in many instances almost to their sources, it usually is practicable—more especially as the Chinese are far advanced in the art of boat-building, and can build boats capable of carrying a large cargo on a light draught. But in Manchuria the hilly nature of many parts of the country renders the streams useless for the purposes of navigation, on account of the rapidity of their currents and the rockiness of their beds, and consequently carts are in more common use than is elsewhere the case. Besides this the rivers are all frozen over during four months or more every year, and the frost that closes the waterways greatly improves the state of the roads, making them as hard as if paved. This tells greatly in favour of cart traffic; and, as most of the carters are small farmers or farm labourers who, but for carting, would be idle all the winter, their services are willingly offered at a low figure. A cart drawn by six mules or ponies, accompanied by a driver and conductor, capable of carrying three tons of produce, can be hired for one Chinese tael, about 5*s*., per day. Such a cart could travel 25 miles daily if on a long journey, or more if on a short one; so a hundredweight of goods could be transported 100 miles for 4*d*. Against this a railway could hardly compete; but in the passenger traffic it would be different. A passenger cart of the common kind, drawn by three ponies, can only accommodate one passenger; its hire is 3*s*. per day; and, at the rate of travelling already given, the cost per mile would be nearly 1½*d*., to say nothing of loss of time.

No estimate has ever been made of the number of carts and draught cattle in the country, but Mr. Commissioner Morgan, in his report on the trade of Newchwang for the year 1890, says that during a period of one hundred days, dating from the closing of the port by ice, there entered that town daily 547 carts, drawn by 2340 animals, mostly mules and ponies, bringing during the period named about 100,000 tons of produce. Most of these carts carried on their return journey a quantity of imported goods.

Innkeeping, as may naturally be supposed under such circumstances, is a lucrative business. I am credibly informed by a gentleman who has visited all parts of the country, that at an inn situated on the great high-road connecting the grain-producing districts with the places at which water-carriage can be procured for the coast, the consumption of pork, the favourite meat of the Chinese, is, during the winter months, about 800 lbs. daily. Sledges as well as carts are used during the winter, and, being light, can travel quickly over the snow, on which account they are particularly well suited for carrying passengers. Telegraph lines connect Port Arthur, Kirin, Mukden, and most of the larger towns of the province with Newchwang, and Newchwang is connected in the same way with Tientsin and Peking.

The climate of Manchuria is well suited to Europeans, particularly to those who come from the northern parts of Europe, as Germans, Scandinavians, and Scotchmen. The severity of the winters, the dryness of the atmosphere, and the boisterous winds in spring aggravate such complaints as neuralgia, rheumatism, lumbago, and sciatica; but, apart from this, there is no disease to be met with with unusual frequency. Small-pox, of a mild type, is not uncommon in winter, and cholera has been known to break out in summer; but this latter disease is probably caused by the insanitary condition of some of the houses of the natives, and by a taste, which the Chinese indulge at any cost, for unripe fruit.

The staple food of the working classes is a grain called kao-liang, a kind of millet, which is eaten boiled, unground. Another smaller grain of a yellow colour, called shao-mi, is also used for food; and beans, more extensively grown than any other cereal, although cultivated principally for the sake of the oil they contain, are an important food-product, as not only is the oil used for cooking purposes, but flour made out of beans is a common article of diet, and the refuse left after the oil is taken out of the beans is often used to fatten pigs. Pork is cheap and plentiful; good beef and mutton by no means scarce; and goat-flesh, more often eaten than any other meat but pork, as the goat is an animal that thrives exceedingly in Manchuria, is abundant. Fish can be had in any quantity in the Kirin district, as the Sungari is full of salmon, and along the coast cod, plaice, soles, mackerel, whitebait, prawns, shrimps, and a variety of other fish are caught. Rice is only eaten by the rich. Of fruits, grapes, pears, Siberian crab-apples, walnuts, and some sorts of plums are grown; but oranges, pumeloes, bananas, and lichees, although in such plenty in the south of China, are all imported articles here, and only to be seen on the tables of the well-to-do.

Poverty, in the sense of actual want, is hardly known, except in time of famine or flood; and the fact that great numbers of workmen resort to Newchwang from other provinces every spring, work there till the port is about to close for the winter, and then return home, shows that there is no lack of employment for those who look for it.

Now that game is rapidly disappearing from most places, except where it is rigidly preserved, few countries offer the sportsman the attractions offered by Manchuria, and few are less visited for the purposes of sport. Wild-fowl, including geese, ducks, and teal, during the spring and autumn, settle by thousands on the marshy lands at the mouth of Liao; and although they keep well away out in the open, and are too alert to be approached within range, they fly so low on a windy day that, by taking a punt into one of the creeks intersecting the marsh, and keeping well out of sight, a shot may be obtained at them as they pass over. They do not confine themselves to this place, but may be found in plenty, during the seasons named, throughout the whole country. Hares, pheasant, partridge, snipe, whimbrel, curlew, bustard, and golden plover are also fairly abundant, and deer, some species of antelope, and tiger, are obtainable in the Kirin and Hei-lung-chiang districts. Of Isaac Walton's favourite sport there is not much to be found in districts drained by rivers running into the Gulf of Liao-tung; but all the rivers running north, into the Amur, contain excellent fish.

PART II.

COMMERCE.

THE bulk of the trade of Manchuria may be classed under three heads: Exports of native produce, imports of foreign merchandise, and imports of native, *i.e.* Chinese production. These, with certain exceptions hereafter to be mentioned, all pass through the port of Newchwang, and it is from statistics compiled at the custom-house there, and published by order of the Inspector-General of Customs, that the following estimates and tables are mainly deduced.

Taking first a glance at the trade of Newchwang as a whole, some idea of the growth that has taken place during recent years in all its branches may be gained by comparing the tonnage of the fleet at present engaged in it with that employed at other times. In 1871, 16 steamers and 203 sailing vessels entered the port, with a total tonnage of 65,933 tons; in 1881, 114 steamers and 218 sailing vessels entered, with a tonnage of 159,098 tons; and in 1891, 372 steamers and 61 sailing vessels entered, with a total tonnage of 334,709 tons. Allowance, to arrive at a correct estimate of the increase in the carrying trade, must be made for a falling off in the number of junks visiting the port; but the allowance need not be much, as cheap freights and quick transit have, to a great extent, built up the present export trade, upon which the shipping mainly depends. It is also interesting to note, in connection with shipping, that in 1871, 38·6 per cent. of the tonnage was British, and 37·6 per cent. German; in 1881, 57·3 per cent. was British, and 29·98 per cent. German; and in 1891, 58 per cent. was British, and 28 per cent. German. The increase in the British shipping corresponds, to a certain extent, with the increase in the number of steamers employed. Next to the German, in the order in which the flags of various countries participated in the trade of the port of Newchwang in 1891, comes the Chinese, with 7 per cent. This is exclusive of junks, made up by steamers only.

The following table, with the items arranged in the order of their importance, gives the names of the principal articles exported in vessels of foreign type during 1891, with their quantities and values. But it is necessary to point out that in the published "Returns of Trade," issued by the Chinese customs, all the values are given in Chinese taels, and as the value of a tael rises and falls with the rise and fall in the price of silver, fluctuating daily, it is quite impossible accurately to change these values into pounds sterling. Twenty years ago, three taels or a little more were equal to a pound; to-day it takes upwards of four and a half to make a pound. Yet, though silver has depreciated so much in value, its purchasing power, when it is required to buy goods of Chinese production only, does not appear to have shrunk much; and on this account it would be but fair, when estimating the value of the exports or the imports of Chinese production, to allow the tael its old value. But this could not be done with the values of the foreign imports, as they have to be paid for in gold, or its equivalent. So I have thought it best, rather than run any risk of creating confusion by having two standards, to compromise the matter by taking the pound sterling as equal in all cases to four taels.

Description of goods.	Classifier of quantity.	Quantity.	Value in pounds sterling.	Remarks.
Beans	tons	247,472	940,983	
Bean-cake	"	182,372	569,364	
Silk, wild, raw, etc. ...	value	—	173,928	Including cocoons and refuse.
Bean-oil	tons	5536	80,474	
Skins	pieces	636,315	52,546	Including raw skins, rugs, and mats.
Ginseng, Corean	pounds	15,492	45,553	
" Manchurian ...	"	106,652	38,114	Including cultivated and wild.
Samshu	gallons	305,000	17,631	
Deer-horns	value	—	16,991	Including young, old, etc.
Medicine	"	—	13,931	
Prawns and shrimps, dried	tons	863	11,932	
Melon-seeds	"	658	10,246	
Sundries	value	—	47,674	
Total			2,019,367	

Each of the above-mentioned exports deserves some notice beyond what is given in the table, so I propose saying a few words on each in turn, taking first the beans. This cereal is by far the most important of Manchuria's products, and gives employment to quite a large army of workers, as boatmen, carters, and employés in the bean-oil mills, in addition to the thousands engaged in cultivating it. There are several kinds of beans, black, red, etc., but the most common kind, generally exported, grown principally in the western parts of the Kirin province, llow. After the crop has been gathered late in the autumn, that portion of it ided for exportation, the largest part, has to be carted either to the port of chwang direct, or to one of a number of grain depôts on the Liao, to be taken there by boat to Newchwang. The largest of these grain depôts is Tung-ng-tzu, nearly 300 miles from the mouth of the river. Forty miles lower down nother called Tie-ling; and 60 miles lower still is a third named Shin-min-tun. -chwang-tai, only 15 miles from Newchwang, is also a grain depôt. At each arge sheds for storing grain from the time of its arrival till the breaking up ice on the river, and many hundreds of boats, generally of a size capable of bout 10 tons, are engaged after the river is opened in transporting it.

ake, a substance containing great fertilizing properties, is made out of e of beans left after the oil has been extracted. It is used in the south na, in the district about Swatow, to which port it is extensively shipped from hwang for manuring sugar-cane fields. The cakes are round, formed by ing the refuse into a mould while damp, 2 feet in diameter, 5 inches , and weigh about 65 lbs. The present price of bean-cake in Newchwang is *6d.* per ton.

ilk is produced in the Liao-tung or Feng-tien province, and is the only product ioned in the foregoing table—that is, unless dried prawns can be counted as oduct—and it is the only one any portion of which finds its way to Europe. quantity shipped at Newchwang last year was 870,560 lbs., valued at £143,906; remainder of the sum of £173,928 given in the table having been made up by ,873, the value of 426,584 lbs. of silk refuse, and £13,149, the value of 350,636 of cocoons.

In addition to the above, it is worth noticing that a small quantity of silk iece goods, valued at £223, were exported. They were the result of a first attempt o establish a silk factory in this province. The quantity exported does not represent the whole out-turn of the factory from the time of its opening to the end of the year, as silk piece goods are largely imported, and no doubt the bulk of the goods of this class manufactured were disposed of locally. This would tend to lessen the amount imported from other provinces, and also to decrease the quantity of raw silk available for export. And that this is what really occurred may be proved by comparing the "Returns of Trade" for last year, in which only 153,585 lbs. weight of silk piece goods were imported, with the "Returns" of 1890 with 157,781 lbs. A comparison of the quantities of raw silk exported during the last two years is, at first sight, even more striking, as in 1890 the quantity exported was about double that of 1891; but allowance has, in this instance, to be made for the fact that, whereas last year was not a good year for the silk-producers, the year before was an unusually good one.

Bean-oil is exported to all parts of China, but principally to the southern provinces, and is used for both lighting and cooking purposes. Out of a given weight of beans about 9 per cent. of oil can be extracted, and of the remaining 91 per cent. 90 per cent. can be made into bean-cake. Knowing this, it is easy to estimate any year's export of bean-oil if the export of bean-cake is known, information that could not otherwise easily be obtained, as, on account of the fragile nature of the paper-lined baskets into which the oil is put, it is not customary, except when unusually large profits are expected to be obtained by speedy delivery, to ship oil in foreign vessels, but in junks, where, as time is not a matter of primary importance, greater care can be bestowed on stowage; and consequently the quantity entered in the "Returns of Trade" as having been exported is only a portion, usually a small portion, of what has actually left the port.

An estimate of the quantity of oil exported in 1891, based upon a calculation made in this way, shows that instead of 5536 tons, as given in the "Returns of Trade," there were really 18,237 tons. The quantity of bean-cake exported was 182,372 tons, so there must have been 202,635 tons of beans crushed, and the crushing of this quantity of beans would yield, at 9 per cent., the amount of oil mentioned, worth £184,164. That a lot of bean-oil is required to supply the local demand, and is not exported, is a matter for which allowance would have to be made when a calculation is entered into in this way, if it was not for the fact that a lot of oil arrives in Newchwang from the interior extracted from beans whose refuse is not made into bean-cake, but is used to fatten pigs, and this is a set-off against the bean-cake exported the oil of which does not leave the country; and, too, I have only taken into account bean-cake exported in vessels of foreign type, leaving out a large quantity exported in junks.

Ginseng (*Panax quinquefolium*), a root well known to botanists, is highly prized by the Chinese for its medicinal properties. There are many varieties of it, some, as American and Japanese, being imported from abroad; but the best, and by far the most valuable, is the wild ginseng found in the forests of Manchuria. Searching for this root is by no means an uncommon method of earning a living among the peasantry inhabiting the wooded districts to the north and east of Kirin. The value of a root depends greatly upon its age, and this, it is said, can be told by counting the sprouts on its stem, each sprout representing a year. The export duty collected at Newchwang is at the rate of five per cent. of the value, and not unfrequently this is declared at 120 taels per catty, or say £22 16*s*. per pound. The total quantity of wild ginseng exported in 1891 was 263 lbs., valued at £3956. This gives an average value of a little over £15 per pound. The remainder of the 106,652 lbs. exported was cultivated.

Korean ginseng is the most valuable of the cultivated varieties of ginseng, being worth about £3 per pound, while the Manchurian cultivated is only worth, on an average, 6*s*. It appears in the table of Manchurian exports, because Newchwang, being nearer to certain parts of Korea where it is cultivated, is found by the growers to be a more convenient place to ship from than any of the ports in their own country. Consequently, it cannot rightly be included in a list of this country's productions, and the value of the quantity exported, £45,553, must be deducted from the total at the foot of the table.

Under the heading of skins are grouped raw skins, rugs, and mats. Goat-skins, the most important kind both in point of numbers and value, were shipped away last year to the extent of 403,976 raw skins, and 93,820 rugs and mats, equal in all to about 600,000 skins. A good number, but, considering that goats are not bred for the sake of their skins only, but are often slaughtered for other purposes, and that they are bred under very favourable circumstances in Manchuria, the number would really be small if great allowance had not to be made for the quantity used in the country. Dog-skins were exported to the extent of 9660 skins, and 27,960 rugs and mats, equal in all to about 80,000 skins. This number, when allowance has been made for local requirements, is very striking, seeing the dogs from which skins are obtained are domesticated animals, and, as such, it is not usual to find many together. But the whole secret of the business is to be found in the simple fact that each householder has a few dogs, and whenever one dies or is killed the skin is taken off and converted into cash, no matter though its value may be but a few coppers. Other kinds of skins, principally sheep, lamb, wild cat, weasel, tiger, and land otter, were exported, some already made up into clothing, numbering 100,899 pieces. But of late years, as the forests have been cut down and waste lands reclaimed, the exporting of the skins of wild animals, once an important industry, has diminished greatly, the few skins obtained being almost always used in the country; and, in the case of certain favourite kinds of skins, as fox-skins and racoon-skins, large numbers have now to be imported.

In the grain districts, when millet is cheap, and no market within reach on account of the cost of transport, there are large distilleries, in which, out of the superfluous grain, samshu, or native gin, is made. During 1881, 305,000 gallons of this spirit were exported, worth about 1*s.* 2*d.* per gallon. When leaving Newchwang an export duty is collected, but this is less than 1*d.* per gallon; and when imported into any other part of the Chinese empire, an import duty equal to half the export duty previously paid is charged, making the tax, full and half duty combined, about 1¼*d.* per gallon. Yet, with ardent spirits within the reach of all, drunkenness, as a habit, is unknown among the Chinese.

Deer-horns are used by the Chinese for medical purposes, and consequently the value, to a Chinaman, of a pair of horns depends upon the quantity of the medicinal property contained in them. This property, which may almost be called the "virtue," is said to be greatest in the young horns, and to get rarer as the horns grow older. The deer from which the horns are obtained are a true species of deer, the females having no horns; and this, as Darwin has pointed out in 'The Descent of Man,' is the case with all kinds of deer proper, the reindeer only excepted. In substance the horns are not horny, like the horns of a cow or an antelope, but are, when young, composed of a very delicate venous substance, covered with a velvety coating; and when old are osseous rather than callus. For some months after they begin growing they are very tender, and the deer, not liking to touch them against branches of trees or bushes, a thing they are almost sure to do in the forest, will remain in the open, deserting cover, and so many times exposing themselves to greater dangers than the one they flee from. After a time, as the horns grow older, the velvet covering begins to peel off, and, while doing so, causes an irritating, itching feeling that makes the deer rub them against twigs, mossy bark, or any other yielding substance not hard enough to hurt. This rubbing assists the velvet to peel off, and the horns then enter the second or intermediate stage. They are no longer tender, nor are they so hard as they eventually become, but are still going through a process of development. Eventually their growth is perfected, they stand for a time, are shed, to be replaced by new ones, and become the property of the first forester or hunter who has the good fortune to find them. These shed horns, together with any horns taken from deer when they were approaching the time for shedding, have reached the third or final stage, and are the least valuable.

Deer do not shed their horns annually, but about once in three years, and, on account of this shedding, a pair of young horns may be obtained from an old deer. When catching deer the Chinese use a trap, and great care is taken that a deer, when caught, does not break or injure its horns in its efforts to escape. The horns are removed while their natural possessor is still alive, as it is believed that, should a deer die with its horns on, much of the "virtue" would go out of the horns into the expiring animal. To do this, a piece of the skull, with the horns attached, is removed from the head by a sharp blow with a hatchet—a process that causes instantaneous death.

It is said some of the more far-sighted of the farmers in the Kirin district have made an attempt to breed deer, and this attempt, although it has not produced sufficient horns to be a factor in the trade, has demonstrated the possibility of domesticating this animal. But whether deer-breeding will some day cease to be an experiment or a recreation, and will enter the field of practical stock-raising, depends upon whether it can be made to pay.

Besides the horns, the deer is valued for its sinews. Upwards of £1000 was obtained by exporters of these last year; and a substance called deer-horn glue, a kind of gelatine, used by the Chinese as food for sick people, made out of deer-horn, contributed them another £250. When brought to Newchwang to be exported, this article is made into cakes an inch square by a quarter of an inch thick, is transparent, and, but for being rather lighter in colour, is not unlike carpenters' glue. Like our calves'-foot jelly, it possesses strengthening properties. It is sold readily, if genuine, at 5*s.* per pound, but it is usually very much adulterated.

Much has been written by travellers about Chinese medicines, usually in a spirit of ridicule, as if, though nothing else in their books should be provocative of mirth, this subject might confidently be relied on to raise a laugh. A common belief is that Chinese medicines consist almost entirely of mineral substances, the vegetable kingdom being little drawn upon. But the opposite is the case. In Mr. R. Braun's work, 'A List of the Chinese Medicines exported from Hankow and the other Yangtze Ports,' which contains the names of most of the medicines in use in the central parts of China, there are 412 medicines, classed as under: Insects, 9; roots, 113; barks and husks, 25; twigs and leaves, 16; flowers, 21; seeds and fruits, 93; grasses, 18; sundries, 117. The sundries may be subdivided into 34 herbal products, 32 animal products, and 51 mineral products. Now, taking the roots, barks, etc., and adding them to the 34 herbal products, we have 320 medicines obtained from the vegetable kingdom; then to the 9 insects add the 32 animal products, and we have 41 medicines obtained from the animal kingdom; and, as already mentioned, there are but 51 mineral products. Nearly all the medicines I have classed as "mineral products" are simply preparations of iron, mercury, lead, zinc, etc., counterparts of medicines to be found in any European laboratory. The curiosities of the Chinese pharmacopœia are to be found in the animal department, but even then it must be remembered that they are only the curiosities.

Manchuria is particularly rich in medicines; for, besides ginseng, the first of roots, there are at least sixty other medicines exported, nearly all of which are herbs, barks, etc.

Of prawns and shrimps, dried, in 1891, 863 tons were shipped from Newchwang in vessels of foreign type; and there were also 106 tons of dried or salted fish exported, valued at £1243. Sea-salt, obtained by evaporation, is very plentiful along the coast of the Gulf of Liao-tung, and fish-curing is consequently a profitable industry. The amount exported by no means represents the quantity cured, as a much greater quantity is required to supply the markets of Mukden, Kuan-chun-tzu, and other large cities, than leaves the country.

The great demand for melon-seeds is created by the curious Chinese custom of eating them as a pastime. They are offered for sale at all fairs, theatres, tea-shops, and places of amusement, and are, together with tea, sweetmeats, etc., commonly put before visitors. To crack them with the front teeth and extract the kernel without breaking it, is an art at which all Chinese are adepts.

Although upwards of £6000 worth of raw tobacco was exported from Newchwang last year (1891), it cannot be said, even with this fact in view, that the smoking habit tends to enrich the people of the province, as the value of the prepared tobacco imported exceeded by 200 per cent. the value of the local product exported. But as most Asiatics are smokers, it is as well for those living in Manchuria to be able to grow their own tobacco. Besides the tobacco exported raw, there was a small quantity—about 37 tons—exported in a prepared state; but the demand for Manchurian tobacco of any kind, out of the province, is not great, as, though good, it is too strong to suit the general public. Most of the leaf exported is used to mix with other tobacco before it is prepared, and in this way is sold in unrecognizable form.

Under the generic heading "Sundries," pigs' bristles, musk, liquorice, pearl-barley, castor-oil, horsehair, jadestone, and a number of other things are collected. The first-named, generally shipped viâ Shanghai to Europe, are obtained from animals that are, in Manchuria, protected by nature with a coating along the top of the spine and the back often six inches long. They are used in the brush trade.

Musk is procured from the musk-deer (*Moschus moschiferus*). . It is contained in a small bag about an inch and a half in diameter, called the pod, found in the abdomen of the male deer. Although a granular substance, the grains adhere to one another so closely that they form a solid mass soft to the touch. In colour it is a reddish-brown; and in taste, acrid and astringent. The deer that supply it are found in the north-east parts of the Kirin province, and are hunted during spring and summer. The very young ones have nothing in their pods, and the secretion in the pods of the old ones is weak and of inferior quality. The best is obtained from bucks in the prime of life, taken at the rutting season. A pod weighs from 4 to 10 drams, usually about 7, and contains, taking the 7-dram pod as a standard, nearly 3 drams of musk. At Newchwang musk is worth, pods included, from 12*s.* an ounce upwards.

Such, then, is the export trade of Newchwang as shown in the "Returns of Trade." But, although these returns are quite correct so far as recording the quantity of merchandise exported in vessels of foreign type is concerned, which is all they are intended to show, as the other existing branches of trade do not come under the cognizance of the imperial customs, the fact must not be overlooked, when estimating the value of the whole export trade of the province, that there is a large junk trade, a trade in grain and oil with Russia, a trade in live stock with northern China, and a trade in timber from the country around the Yalu, yet to be considered.

The number of junks entering and subsequently clearing from Newchwang in 1891 was 1662. Of these 843 cleared for Tientsin, 287 for ports in the Shan-tung province, and 532 for ports farther south. Of the quantity of bean-oil shipped by them I have already said something, but of other kinds of cargo it is not possible to estimate the amount with any degree of accuracy; all that can be done is to make a rough estimate based upon the number and tonnage of the junks engaged in carrying it. Those in the Tientsin trade may be taken at 35 tons register each, which gives 29,505 tons for the 843 junks engaged. The Shan-tung junks are smaller, not more than 20 tons register on an average, at which rate 5740 tons cover the 287 clearances in this direction. Junks coming from the south, from Shanghai, Ningpo, Fu-chau, and Amoy, and also from some non-treaty ports, are much larger than those engaged in the Tientsin or Shan-tung trade, that have only to navigate the Gulf of Liao-tung and the Yellow Sea, often being upwards of 100 tons register, but, taken generally, may be put down at 80 tons each. This, for the 532 junks that left with cargoes for the south, represents an aggregate of 42,560 tons. Taking all classes of junks together, the total is 77,805 tons. Now, turning to their cargoes. To Tientsin little is sent but kao-liang and shao-mi, and to the ports in Shan-tung the same; but for the south, the junks leave laden with beans, bean-cake, samshu, medicines, salt fish, and bean-oil; in fact, with the exception of silk, ginseng, and deer-horns, they take the same kinds of cargo as the steamers and other vessels of foreign type. So, if we take from the total value of the merchandise shipped in vessels of foreign type the value of the silk, ginseng, and deer-horns, and then take from the total number of tons register that cleared from the port the number of tons register required to contain the silk, ginseng, and deer-horns, we shall have left the value of the general cargo such as is carried by all classes of vessels, and the number of tons of space required to carry it. From this we can easily reckon the value per ton of general cargo, and, knowing the number of tons engaged in transporting goods to the south, can calculate the value of the total quantity. This illustrated is as follows: total value of merchandise shipped in vessels of foreign type, £2,019,367; less value of silk, ginseng, and deer-horns, given in table as £274,586, equals £1,744,781. Total number of tons register of foreign shipping cleared outwards, 334,709; less space required to stow silk, ginseng, and deer-horns, which would be about 700 tons register, say 709 (allowance has been made for the difference between a ton weight and a ton measurement), equals 334,000. Value of general cargo per ton, £5 4*s.* 5*d.* Value of cargo contained in 42,560 tons space in junks' holds cleared for southern ports, £222,198.

To this must be added the value of the grain cargoes shipped to Tientsin and the Shan-tung ports, which has to be estimated in much the same way as the foregoing estimate of the value of the general cargoes was made, only that, as the value of a ton of kao-liang can be ascertained by inquiry, no calculation is necessary to find it out. At present the price is considerably in advance of what it usually is, but last year normal prices prevailed, averaging 4*s.* per picul (Chinese weight equal to 133 lbs.), or £3 6*s.* per ton. Shao-mi, of which about one-sixth of the cargoes consists, is worth £4 per ton. The number of tons register cleared for the places mentioned was 35,245, and this, allowing that about 30 cwt. of grain can be stowed to the ton of a vessel's register, gives 52,867 tons as the actual weight of the grain. Of this 44,056 tons were kao-liang, worth £145,385; and 8811 tons were shao-mi, worth £35,244. So the total value of the grain cargoes was £180,629; and the total value of all kinds of cargo shipped from Newchwang in junks during 1891 was £402,827. But the junk trade is not, like that of the steamers, confined to Newchwang. All round the coast are ports frequented by native craft, some small, only entered by boats from the neighbouring province, or as a place of refuge by passing vessels; others large, with a native trade almost equalling that of Newchwang. The principal of these are Chin-chau, Fu-chau, Pi-tzu-wo, and Taku-shan. The export trade of the first named is probably worth £300,000; that of the second and third about £200,000 and £150,000 respectively; and of the last-named, from which large quantities of timber are shipped, partly to other ports in Manchuria, but to ports in Shan-tung and Pechili as well, about £350,000. If to this is added another £250,000, to cover the value of the exports leaving the country through small ports unnamed here, the total value of the export trade, as conducted in junks by sea, will be brought up to £1,652,827. These figures are only approximate, but when the trade from San-sing to Khabarofka, and from the province of Kirin to Peking overland, is treated of, even approximate figures cannot be given. All that can be said is that large quantities of grain and oil leave San-sing in junks as soon as the Sungari is free of ice each spring; and the junks, after discharging their cargoes at Khabarofka, return, sometimes bringing small quantities of foreign goods with them. The overland trade between Kirin and Peking is almost, if not quite, confined to trade in live stock, but no doubt quantities of other things, as grain, oil, and samshu, find a market in parts of China and Mongolia adjacent to the Manchurian frontier. The live stock, mostly pigs, could be sent frozen in the winter without the use of refrigerators, as with the thermometer ranging from 10° above to 20° below zero, as it frequently does in the part of the country traversed, there would be no reason to fear a thaw; but the cost of transporting dead animals is so much greater than the cost of sending live ones in droves, that this method of getting one's pigs to market is not likely to be tried till there is a railway. Without the grain trade with Russian Manchuria and the overland trade with China, the value of the export trade, including that conducted by steamers from Newchwang, and that conducted by junks from Newchwang and other ports, amounted in 1891 to £3,672,194. At any time, if the Government was to permit mining, a stimulus might be given to trade and the prosperity of Manchuria advanced by working the minerals, consisting of gold, silver, lead, copper, and coal, to be found in the country. But at present, except in a few cases where special permission has been obtained, or, as in the case of gold coming from the district to the north-east of Kirin, where mining is carried on clandestinely, nothing is done to turn the mineral wealth to account. Coal, it is true, has long been mined, and very good coal the Manchurian coal is—a kind of anthracite; but the method of mining it is obsolete, and, for want of proper pumping-gear, the mines are constantly getting flooded. Last year the price asked in Newchwang for Manchurian coal, twelve dollars per ton, was considered so outrageous that the foreigners generally refused to buy it, and a supply was obtained from Hankow.

Imports are of two kinds, those of Chinese production, and those coming originally from abroad, but usually received in Newchwang after having been first landed for transhipment at Shanghai. The former do not present any features of interest, except in the case of a few articles, the supplying of which is being competed for by manufacturers in Europe and America. Among these cotton goods take the first place. Prior to the opening of Manchuria to foreign commerce, dealers in nankeens and native cotton cloth in China had this market almost in their hands, as not much in the way of spinning and weaving was then done in the country, although a little raw cotton was imported from Ningpo, and some was grown locally. But since Newchwang became a treaty port, increasing quantities of foreign cottons have been imported, and importations of nankeens appear to have fallen off. Not that this falling off can be attributed solely to the presence of English and American piece goods, as the great advance made in the importation of raw cotton and Bombay yarn, the former, now one of the most valuable native imports, and the latter a thing unknown here ten or twelve years ago, testify to the development of home industries.

The other imports of native production are chiefly sugar, silk pieces goods, Chinese paper, rice, medicines, prepared tobacco, grass cloth, preserves, jadestone-ware, vermilion, brass buttons, and fans; but beyond the point at which foreign goods cease to compete, the native trade is only interesting to Europeans concerned in shipping. Rivalry between steamers running on the China coast, mostly foreign-owned, and native craft has been keen enough in years past, but competition between the various steamship companies, of late pushed to a degree hardly warranted by prudence, must have made times unusually bad for the owners of junks. That is, for the owners of junks trading between the treaty-ports, such as those bringing cargoes of raw cotton, paper, and nankeens to Newchwang from Ningpo, Fu-chau, and Shanghai. Smaller craft, sailing between treaty-ports and the smaller ports that are, in a sense, subsidiary to the treaty-ports, have, perhaps, benefited by the stimulus given by cheap freights to trade generally.

The total value of the native goods landed in Newchwang last year from vessels of foreign type was £733,586; but a much greater quantity must really have been received, otherwise a great discrepancy between the value of exports and imports could not be accounted for.

The foreign imports can best be treated of by dividing them under the sub-headings of cottons, woollens, metals, sundries, and opium, as is done in the "Returns of Trade." To the first allusion has been made when speaking of raw cotton, but something yet remains to be said, as the demand in all parts of the

Chinese empire, not excepting the province of Manchuria, for cotton goods is so great that, although sellers from every direction are crowding into the market, the efforts of each appear to be crowned with some measure of success. Thirty years ago, dealers in Manchester goods in China had little to fear from competition except that of the dealers in nankeens and native cottons; but now, they not only have to fear American and Indian rivalry, but cotton piece goods are being manufactured in foreign style in China itself. That such would be the case was not unforeseen, but as yet, the industry being only in its infancy, it is impossible to say what effect it will have upon imported cottons. It appears, though, that, as most of the cotton grown in China has hitherto been made into nankeens, or used as wadding for winter coats, very little being sent out of the country, and such exportations as have been made being insufficient to give China a place among cotton-exporting countries, by using the surplus raw cotton of Kiang-su, the province in which the mill has been established, and of the neighbouring province of Chekiang, the only provinces that have any raw cotton to export after satisfying their local requirements, a heavier blow will be struck at industries carried on in outlying provinces, such as Manchuria, that draw a portion of their raw material from the provinces mentioned, than at the manufacturing centres of Europe or America. Some of these native drills and sheetings have appeared in Newchwang, and have met with a favourable reception. They look very American, a point in their favour, as the preference given to American goods of this class is yearly growing more marked. English cotton goods are largely imported, but are generally lighter cottons, such as T-cloths, white or grey shirtings, prints, and lastings; when heavy material is wanted, American drills or sheetings are usually chosen. Indian sheetings are also imported, but they have a dirty appearance that goes against them. A net total of 984,106 pieces of cotton goods was imported into the province last year, of which 677,640 pieces were from America; 8625 pieces from India; and the remaining 297,841 pieces from England. Of the American goods, 220,715 pieces were drills, and 456,505 pieces were sheetings; while of the English goods, only 26,170 pieces were drills, and 28,000 pieces sheetings. In addition, there were imported from England 71,172 dozens of cotton handkerchiefs; and a portion of the goods classed in the "Returns of Trade" as nankeens were English cottons dyed in China. Indian cotton yarn, the most valuable foreign import, was received to the extent of 8050 tons, valued at £513,816.

Woollen goods are not used in Manchuria to the extent that the rigour of the climate would suggest, but the demand is increasing and imports advancing, and as the supply is obtained almost entirely from England, the Chinese having no woollen manufactures to speak of, the outlook in this direction is a bright one. To the use of furs and fur clothing is mainly attributable the slight appreciation of woollens, and it cannot be denied that even the thickest cloth that finds a buyer in Manchuria is quite inadequate to protect a person from the winter's cold. Better cloths are made in England, but their prices are prohibitive, and so far nothing has been introduced that has found so ready a sale as Russian cloth. What is wanted is a cheap, rough woollen cloth, not everlasting, but capable of standing a couple of winters' wear. In making anything for this market, it must always be remembered that the majority of the people are agriculturists, among whom, more so than among the inhabitants of towns, ready money is scarce, and the cheapest article is, therefore, almost sure to be the first to find a purchaser. Most of the farmers borrow money on their crops long before they reap them, often at a rate of interest that would be considered usurious in England, so they find it less expensive, if they want money for clothing, to borrow only sufficient to procure them the commonest kind, rather than incur a heavy liability by buying good ones, the cost of which would be enormously augmented by interest paid upon the original purchase-money.

At present the principal kinds of woollen goods imported are not heavy cloths, but such light woollens as lastings, camlets, long ells, and woollen and cotton mixtures. Goat-skins will probably always be used to make the winter coats of the poor, but as the finer kinds of furs get scarcer the rich will take more and more to woollens.

The total number of pieces of woollen goods imported last year was 38,979, including some woollen and cotton mixtures, and the value was £68,513. The principal items contributing to this were: lastings, 15,502 pieces; long ells, 7224 pieces; English camlets, 2220 pieces; Russian cloth, 1210 pieces; woollen and cotton mixtures, mostly Italian cloth, 11664 pieces; and Spanish stripes, 922 pieces.

Concerning metals, it is interesting to note that, although English hardware and cutlery are not imported to any extent worth speaking of, there is a constantly growing demand for lead, tin, tin plates, copper sheets, steel, white metal, and manufactured iron. Old iron is also largely imported for use in blacksmiths' shops. It arrives in lots consisting of broken angle-irons, old chains, cart-tires, fish-plates, fire-bars, horseshoes, and, in fact, any refuse or sweepings that can be collected in the forges and foundries of Europe, no matter what, from a rivet-head to an Atlantic liner's boiler.

Of manufactured iron, the kinds known as nail-rod, bar iron, and sheet iron, are most in demand. Importations of the former last year were valued at £15,158, and of the bar iron at £5240. Lead in pigs figures in the "Returns" for £5288; tin in slabs for £4854, copper sheets and plates for £1512, tin plates for £1854, steel for £4138, and white metal for £8373. The total value of metals of all kinds imported was £118,716, of which sum £51,997 were contributed by old iron, and £8373 by copper slabs from Japan.

The following is a list of all the goods named in the "Returns," under the sub-heading "Sundries," of which £1000 worth or upwards was imported last year:—

	£	
Matches	33,446	Austria, Sweden, and Japan.
Aniline dyes	17,690	Germany.
Needles	16,596	"
Kerosene oil	14,825	Russia, £8265; America, £6560.
Seaweed	13,939	Russian Manchuria.
Black pepper	8,092	Java and Singapore.
Brass buttons	4,916	Britain and Germany.
Star aniseed	4,888	Japan.
Furs	4,684	Russian Manchuria.
Sugar	4,681	Hong Kong.
Window glass	4,640	Britain.
Cardamons	4,191	Cochin China.
Shark's fins	3,765	Singapore.
Gunny bags	3,173	Britain.
Clocks	2,962	America.
Chinaware	2,953	Japan.
Betelnuts	2,524	Tong-King and Siam.
Cotton umbrellas ...	2,292	Britain and Japan.
Isinglass	1,953	Japan.
Deer-horns	1,815	Russian Manchuria.
Sapanwood	1,533	Singapore and Siam.
Bicho-de-mar	1,527	Japan, Singapore, and Manila.
Small sundries ...	22,199	
Total	179,284	

Something has yet to be said of Indian opium. Twenty years ago, in 1871, it contributed over 60 per cent. of the total value of all the foreign goods imported; last year it contributed less than 2 per cent. Importations year by year have declined, while the acreage in the province devoted to its cultivation, or rather to the cultivation of native opium, has extended. A small quantity of the Indian drug will probably always be imported for the use of the rich, but it is not likely ever to regain the hold it once had on this market. Last year's consumption was 34,613 lbs., valued at £26,483. Of this 27,733 lbs. were Malwa opium, and the rest consisted of 2720 lbs. of Patna, 3360 lbs. of Benares, and 800 lbs. of Persian.

The total value of the foreign imports entering Manchuria through the port of Newchwang during the year 1891, is shown in the following table:—

	£
Cottons	1,122,174
Woollens	68,513
Metals	118,716
Sundries	179,284
Opium	26,483
Total	£1,515,170

The extent to which each nation participating in this trade is interested cannot be exactly ascertained, but the following table, the result of a careful calculation, is accurate enough for all practical purposes. Russia, it will be seen, is represented as having trade valued at £37,501, but very little of this comes from Russia in Europe. The bulk of it consists of shipments of seaweed, furs, and deer-horns from Russian Manchuria and Siberia. The first named, by far the most important item, is an article of diet, as it is used by the Chinese as a vegetable.

	£
Great Britain	346,995
India and other British* possessions in the East	570,766
America (United States)	453,914
Germany	38,025
Russia	37,501
Other European countries	35,150
Japan	26,932
Other Asiatic countries	5,887
Total	£1,515,170

In addition to the above, some foreign goods find their way into the country by way of the Amur, on which river, when it is not blocked by ice—only four months of the year—the Russians have steamers running. The value of these imports is small, as the trade is confined, or almost confined, to the northern part of the thinly peopled province of Hei-lung-chiang. There is also a little trade carried on across the frontier of Russian Manchuria, near the town of Hun-chun. Goods are conveyed by steamer from Vladivostock to Possiet harbour, and then by cart to the adjacent towns. This trade is said to be partly in the hands of Japanese.

PART III.

CONCLUSION.

Having, in Part I., described briefly the geography of Manchuria, given a short account of the history of the Manchus, not omitting to say a few words about their origin, and touched lightly upon other matters of interest, and, in Part II., treated at greater length, the commerce of the country, it only remains to say a few words about the outlook for the future. At best, this can but be speculated upon; yet such speculations, guided, as they may be, by knowledge gained by thirty years of commercial intercourse, need not rush blindly beyond the pale of probability, as such speculations too often do, but can, at any rate in some direction in which progress is being made, arrive at conclusions that, although alluring, may yet reasonably be expected to be realized before the number of years during which we have had a port in Manchuria open to our trade has been doubled.

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* Goods coming from Europe, but landed at Hong Kong for transhipment, are classed according to the place they originally came from.

For a country to be wealthy, it is necessary, before all things, for it to possess, as Manchuria does, arable lands and rich pasturage, and an energetic population devoted to agricultural and pastoral pursuits. Minerals may attract people to a country, and money obtained by mining may do much good if expended on roads, railways, canals, and other works of permanent utility; but minerals should not be looked upon as lasting sources of wealth, and frequently the gains of the digger are squandered as recklessly as those of the gambler. Even the collieries of England are so far from being inexhaustible that it is considered probable that in less than two centuries the factories of Manchester and Leeds, being dependent on the use of steam, will have ceased working for want of coal. But it is not of countries in Europe so much as of colonies, or as yet undeveloped lands, that I am thinking. Take, for instance, New South Wales and the Mexican Republic, and compare the two. It is 374 years since Cortes landed at Vera Cruz, to begin, with his small army, the conquest of a country containing an area of 750,000 square miles, and blessed with every advantage nature can bestow—boundless pastures, a soil fit for the cultivation of all kinds of cereals, yet producing cotton, sugar, coffee, and other kinds of tropical and semi-tropical plants as well, forests of useful and ornamental timber, and untold mineral wealth. On the other hand, it was only in 1788 that Captain Phillip landed in Sydney Cove the first batch of convicts sent to Australia, after having vainly endeavoured to put them on shore at Botany Bay, and it was not till thirty years later that any persons, but those who had no option, took up a residence in the place. Still, in the short time that has elapsed since voluntary emigration to New South Wales began, with less than half the area of Mexico, with much of the land badly watered, and without the aid of native labour, this colony has been brought to such a state of prosperity that it has already exported in one year produce worth upwards of twenty-two million pounds, while Mexico cannot yet export to the extent of twelve millions annually. Gold has been found in the colony, and found in large quantities, but the gold-mines contribute less towards this state of prosperity than is contributed by the million and a quarter acres of land brought under cultivation, and the fifty-six million sheep, whose wool crop for 1890 was valued at £9,232,672. The whole difference between the state of the colony and that of the republic is the result of the difference between the men in possession. The followers of Cortes were military adventurers, while the early Australian settlers were mechanics and farm labourers. Waste lands and the absence of commerce are the natural outcome of militarism. To this rule Manchuria has been no exception. Before the conquest of China, the respect in which the profession of arms was held was alone sufficient to show that the country had little commerce. Acres by the thousands remained uncultivated, and probably the crops that were raised were left to the care of women, in which case irrigation would be neglected, no attempt would be made to disencumber the land of timber, and no effort put forth to produce anything not required to satisfy the immediate wants of the individual homestead. After the events of 1644 great numbers of the Manchus left the country, but the military spirit was still fostered among those that remained, as employment in the Manchu army maintained in China could be readily obtained, and, being more in accordance with the tastes of the people than husbandry, was sought for by the best men of each successive generation. In time such numbers of the Manchus had been assimilated by the Chinese that parts of Manchuria were almost depeopled, while other parts were left, at most, but very sparsely populated. Yet for years, I might perhaps say for centuries, settlement by Chinese in this nearly deserted territory was discouraged, and, where land was reserved for royal domains, was prohibited. At length escaped criminals, outlaws, and other bad characters took to the Manchurian wilds as places secure from the reach of the authorities, and, uniting with the dregs of the old inhabitants, formed themselves into bands of brigands that were often so strong that the Government was powerless to cope with them. For years they ruled whole districts, levied taxes, compelled payment of tolls by persons visiting the country for the sake of trade, and were accustomed to rob or plunder when other means failed; and in the end, if, after some unbearable display of their audacity, the officials in the capital, being provoked beyond endurance, called out the military, they retired into the mountain fastnesses, where pursuit was impossible. Very little was exported but gold-dust, found in the sand along the river-beds in the district to the north and east of Kirin, deer-horns, and ginseng, and trade, even in these few articles, was only conducted with the greatest difficulty. Carts conveying merchandise had always to be escorted by armed men, and then were frequently pillaged, as the guards engaged in Newchwang were generally a worthless lot of scamps, who could be relied on for nothing but to take to their heels at the first approach of danger. Matters at one time reached such a pass that no trade with the interior could be carried on at all. But the brigands, finding this as much to their detriment as to that of the merchants, were obliged to adopt a method of re-establishing the confidence of the latter. To do this, they send one of their number to Newchwang to open an insurance office, and accept risks against losses by brigandage on goods going inland. The amount of insurance charged was a percentage of the value of the goods insured, but the percentage varied according to the locality to which the goods were to be sent. Carts left Newchwang in company, some eight or ten going together so as to form a convoy, each convoy being supplied with an armed escort at the expense of the underwriter. Not that there was much for an escort to do, as the flying of a small flag given to every cart at the insurance office, as it showed that duty had been paid, secured immunity from pillage; but it appears to have been intended as a screen to cover the connection between the underwriter and the brigands, and it probably also acted as a protection against the attacks of isolated parties of "road agents." Up to the present day goods are insured before being sent inland, not that it is likely that the underwriters have any direct connection with brigands, although they may occasionally pay toll to them; and the custom of flying flags, now intended simply to show in what office the goods are insured, is still adhered to.

At what period the re-settlement of Manchuria began is doubtful. Probably, in the days of the early Manchu kings, the Chinese provinces adjoining Manchuria, being continually raided by the Manchus, were not very thickly populated, and after the conquest of China, till they were filled, no tide of emigration set towards Manchuria. When it began, steps were taken to stem it; but of late years the Yellow River floods, which rendered thousands homeless, and other such disasters, have thrown so many destitute persons on the hands of the authorities that settlement in Manchuria has not only been permitted, but, so far as the districts bordering Russian Manchuria are concerned, has been encouraged. Only the northernmost province, Hei-lung-chiang, is now closed, and petitions, which will probably soon be granted, have already been addressed to the throne by the local officials, praying for its opening.

he increase in trade that has gone on concurrently with the increase in
lation is very noticeable, if the statistics for the last ten or twelve years are
ared. In the year 1881, the first proclamation notifying the intention of the
rnment to permit settlement in certain parts of Manchuria was issued, and,
ugh prior to that time progress was being made, it was made so slowly, as
ared with the rate at which it has since advanced, that it is, perhaps, due to
year to name it as the one from which the present era of prosperity dates.
t would be expecting too much to expect the rate at which progress has been
since this era began to be maintained for a lengthened period, and, although
rmitting free immigration, making railways, and turning the mineral wealth
country to account, much might be done to keep it going for a time, it would
fair to base any calculations upon it. Better to look for some earlier land-
the commercial history of the country and date from it, spreading out, as
, the increase, so that it may cover a longer time, and give a lower rate of
ss, but a fairer average. The opening of the port of Newchwang to foreign
erce would furnish just such a landmark as is required if the "Returns of
e" for the first year were available, but they are not, nor are they to be had
ny year earlier than 1867. In 1867 the quantity of cotton piece goods
ted was very small, not much more than one-third of the quantity received
the following year; and this, as cotton goods are a very important factor in
nport trade, would tend to make the increase in the consumption of one of the
es in which we are chiefly interested greater than it really has been. So it
not do to take the year 1867, and after it no year till 1871 has any special
to selection. The last-named year was not a particularly good one, the
orts principally having been rather small; but it is well situated for the purpose
comparison, as it comes as many years before the year from which dates the
esent commercial era as last year comes after it.

The following table shows at a glance the advance made in the foreign import trade during the last twenty years:—

Description of goods.	Classifier of quantity.	Quantity—net imports.		
		1871.	1881.	1891.
Cotton piece goods	pieces	243,450	434,028	989,791
Cottons, miscellaneous, as handkerchiefs, towels, and yarn	value—£	—	2,472	521,913
Woollen goods	pieces	10,600	22,558	38,979
Metals	value—£	*11,187	35,534	118,716
Opium	pounds avoir.	304,220	59,568	34,618
Sundries	value—£	*33,074	54,624	179,284

The great increase between the years 1881 and 1891 in "Cottons, miscellaneous" is due to the introduction of cotton yarn. The quantity of this commodity imported in 1882, the first year it appeared in Newchwang, was about 5½ tons. In 1891 no less than 7682 tons were imported, all but 17 tons of which were from Bombay.

The total value of the foreign merchandise imported in 1871 was £486,401; in 1881, £385,837; and in 1891, £1,515,171. The year 1881, therefore, when compared with 1871, shows a falling off in the total value of imports from abroad, but this is due entirely to the smallness of the quantity of opium imported in 1881, as all other kinds of foreign goods were consumed in greater quantities. In 1871,

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* Approximate.

opium was so largely imported that its value represented upwards of 60 per cent. of the total value of all foreign goods imported; in 1881, it represented less than 16 per cent.; and in 1891, less than 2 per cent. But in spite of the falling off in the importation of Indian opium, due to the cultivation of the poppy in Manchuria, an enormous increase in the foreign imports has taken place. For the period 1881–1891, it has been at the rate of 292 per cent.; and for the whole period 1871–1891, the rate of increase is upwards of 211 per cent. Of the increase in imports of native origin from other parts of the Chinese empire, it is not necessary to say anything, as the matter only bears indirectly upon our commercial relations with Manchuria; but of the native exports something must be said, as upon them depends Manchuria's ability to purchase goods manufactured by others. In 1871 the total value of the exports was £363,077, and as in 1891 it had reached £2,019,397, an increase of 456 per cent. has been made in the quantity of produce exported in vessels of foreign type. To some extent this may be attributed to the preference given to foreign vessels by shippers of native cargo, but the increase has certainly been very great, more particularly during the last ten years.

In twenty years, supposing the rate of increase of the last twenty is maintained, the value of the foreign import trade will be £4,712,181. If, happily, the rate of the last ten is maintained during the next two decades, the value of the foreign trade will then be £23,223,506. But, as already stated, it would be unfair to base any calculations upon the keeping up of this rate of progress for any length of time. Everything depends, at present, upon the export trade, and the growth of the export trade depends upon the opening up of the Hei-lung-chiang province, and the improving of the means of communication and facilities for transporting goods. It is almost certain that before many years are over, perhaps not more than two or three, a railway will be constructed through a part of Manchuria, but it will be for strategic, rather than commercial, purposes. At this time a line is being slowly pushed forward from Kai-ping, in the province of Pechili, towards Shan-hai-kwan, on the Manchurian frontier. Shan-hai-kwan may be reached in two years, but after that the rate at which the line will progress towards Kirin, its terminus, as at present projected, will probably depend upon how the Russians are getting on with the trans-Siberian railway. The connection of the line now being laid down from Vladivostock westwards with the one that is approaching the East from Europe will, I think, be followed by a display of activity on the part of the Chinese. In time, the line to Kirin being finished, a branch line will be made to connect it with Newchwang, and may even be continued to Port Arthur. Under these circumstances it will, if properly managed, pay well, as, although the cost of transporting goods by cart during the winter months is not excessive, if the hire of the cart only is considered, it is sure to be patronized by the grain-growers of Kirin and the merchants of Newchwang and Mukden, as goods or produce sent by it will not require to be insured, and armed guards will be dispensed with.

Manchuria, let it be said in conclusion, already stands before Newfoundland, our oldest colony, as an importer of manufactured goods, and in twenty years will be ahead of Turkey in Europe, the Colombian Republic, and British Guiana, and may, under favourable circumstances, particularly if the custom, common in China, of settling disbanded soldiers on crown lands * is not followed in this province, take

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* In a well-known Chinese book, entitled 'Indulgent Treatment of Foreigners,' written by Admiral Peng, Tu-lin, and others, is this passage, "Ching Kwoh's (B.C. 52) best method to guard the frontier was by colonizing soldiers on the borders, and Li Muh was unsurpassed in his watch over the frontiers. Follow the essential methods of these men, *e.g.* (*a*) Colonize soldiers on the borders in the New Dominion, Mongolia, etc."

precedence in this respect of Portugal, Mexico, and Cape Colony. Then, as now, Great Britain, America, Germany, and, with a larger share than at present, Japan will be the chief participants, unless it should happen that attempts—which sooner or later, as opportunity offers, are almost sure to be made, but which it may be the policy of the nations just mentioned to frustrate—should prove successful in placing the land under the dominion of a certain monarch, whose first act would be to strike a death-blow at the foreign import trade.

CHINA, JAPAN, AND KOREA.*

By BARON F. VON RICHTHOFEN.

THE universal interest aroused by the war which broke out between China and Japan in July last, and its necessarily far-reaching consequences, make it desirable to become acquainted with the geographical conditions of the theatre in which it is being waged. The two empires have fought many times before, and then, as now, Korea has been the chief seat of land operations; but unlike what was then the case, when Europe remained unacquainted with and unmoved by the course of events, she has now supplied the weapons to the combatants, and is closely affected by the issue of the struggle.

The author's acquaintance with Korea dates from a time (1869) when the country was still a closed land, and the neutral zone erected by the Manchus cut off all intercourse with China, except at the time of the markets held three times a year on the frontier. At one of these he was present, and thus gained the opportunity of personal intercourse with natives of the country. Others, both German and English, have since availed themselves of the increased facilities for becoming acquainted with the country, but the writer's intimate acquaintance with the northern Yellow Sea and neighbouring regions enables him to speak with authority on the theatre of operations as a whole.

The series of curves by which the Asiatic continent is bounded to the east have this general characteristic in common, that they possess on the whole a regular shape, convex to the east. Outside of them are the curved lines of islands which close the continental mass towards the deep basin of the Pacific. Just where the Japanese curve approaches the mainland, the coasts of the latter are more fully developed, and portions of an ancient mountainous continent project into the sea, composed mainly of gneiss, granite, and other archaic formations, which, in the long ages which have elapsed since the land was last covered by the sea, have become denuded into their present form. The lower lands between them have been covered by the gradually rising ocean, giving rise to the Yellow Sea, which stretches as a broad gulf 460 miles into the mainland. Eastward lies the peninsula of Korea, an anomaly in the structure of Eastern Asia, both for its south-east direction and its form. The ancient schists and granite form a watershed close to the east coast, rising to a height of over 6550 feet, and sloping south and west to the sea in gentle much-undulating hills. Thus Korea, like Italy, has an open western and closed eastern side. Although the west coast is steep and has many bays, the shallowness of the sea and the number of sandbanks left bare at low water make access to it a matter of difficulty. The continuation of the peninsula beyond a shallow strait 120 miles wide is formed by the west end of the Japanese islands, which, with a more varied geological history, far surpass it in diversity of form and in climate, as also in the greater development of human activity.

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* Abstract of paper read before the Berlin Geographical Society, October 13, 1894.

The Yellow Sea, with a breadth of 300 miles, has an evenly level floor, and the average depth of its muddy water is scarcely 100 feet. Opposite the mountainous coast of Korea lies the uniform alluvial coast of China. Further inwards the two mountainous peninsulas of Shan-tung and Lian-tung project from either shore, the former an isolated mass, the latter (equally with Korea itself) part of a more extended system, of which the "Long White Mountain," on the frontier between Korea and the Amur Region, is the culminating point. Both peninsulas have steep coasts, rich in bays. They approach to within 65 miles of each other, and divide the Yellow Sea into an outer and inner basin, the former open towards the ocean, the latter a broad closed bay stretching over 250 miles from north-east to south-west. While the southern half or Gulf of Pechili falls within China proper, the northern or Gulf of Lian-tung encroaches upon Manchuria, the cradle of the present Chinese dynasty. On the one side lies Peking, on the other Mukden, each 90 miles distant from the nearest point of the coast. The shores of the inner Yellow Sea are extremely unfavourable to navigation. Apart from the two peninsulas, which, though rocky, are—on this side especially—devoid of good harbours, they are composed of alluvial land with a seaward continuation in the form of banks and shoals. The rivers which bring down the silt allow, on account of the bars at their mouths, but doubtful access to vessels of slight draught. On two of them, however, are the ports thrown open to foreigners: Tien-tsin on the Pei-ho, and Newchwang on the Lian-chu. The roads off the eastern half of the north coast can only be used with a calm sea. From these geographical features, it is evident that the inner Yellow Sea affords an eminent basis of attack on the life-nerves of the Chinese Colossus in its present condition. It was only after the storming of Taku in 1860, and the subsequent taking of Peking, that the need of stronger defences for the coasts was recognized, and the narrow entrance guarded by the construction of naval ports on the two peninsulas, facilitated by the previous surveys of the British Admiralty. Of these Wei-hai-wei, on the north coast of Shan-tung, loses some of its importance by its too great distance from the straits; while Port Arthur, in the bay of Lushun, occupies a most favourable position in the extreme south-west of Lian-tung.

The division between east and west, which the Yellow Sea as a whole occasions, is repeated also in the direction of the interior of the continent. In the centre of the north-west coast lies Shar-hai-kwan, the last fortified gate in the great wall, and this forms the dividing-point between China to the west and Manchuria to the east. The latter begins as a narrow strip 40 miles wide, north of which, and divided from it by a palisade, is the higher land of Mongolia, stretching far westwards to the north of China proper. Where the coast bends to the south-east, the limit between Mongolia and Manchuria retains its north-east direction, subsequently bending northwards and following the Khingan range to the Amur. The latter country thus widens out, and includes both the great plateau traversed by the lower course of the Lian, and the mountainous land of which Lian-tung is the termination. The plain through which the river flows has a great importance historically. With an area equal to that of Westphalia, its surface includes some fertile tracts, alternating with sandy stretches and barren terraces, varied with extinct volcanoes, and forms the centre of the southern province of Manchuria. This it is which takes up the function of the Yellow Sea as a division between two distinct regions, lying east and west of one another. To the west soon begins the uniform, dry, and treeless plateau of Mongolia, the home of nomads and their flocks, bounded to the south by the rich cultivated lands of China proper; to the east is the broken mountain-land, in great part still covered with thick woods, and traversed by numerous streams, the valley floors scanty, but formed of rich alluvium. The mountainous character is most pronounced to the south, giving place towards the Sungari, Ussuri, and Amur to a park-like landscape. The whole region is favoured with copious summer rain, though for the most part dry in winter, and, with the exception of the southern peninsulas, is a land for hunting-tribes and in part for agriculturists.

This difference in the character of the lands is matched by a contrast in the population. While the western uplands have always been the home of a Turko-Mongolian pastoral race, and the lands within the Great Wall have been occupied for at least four thousand years by the Chinese agriculturists, we find in the east a group of races known collectively as Tunguses. The vicissitudes of fortune have brought one or another of these into prominence at different times, that of the Manchus being the most important at the present day. To the south-east are still other races, settled as agriculturists, like the Chinese, who have developed a distinct individuality in their sharply defined habits. Such are the Koreans, and, in a still more marked degree, the Japanese. Whilst these have hitherto taken but a small part in the world's history, the case has been quite otherwise with the Tunguses. One tribe after another has occupied the valley of the Lian, assimilated some degree of Chinese culture, and, issuing forth either against China or Western Asia, has founded a world-empire of vast extent, though short duration. Such were the Kinin, or Siempi, in the second century A.D.; the Tuan-Tuan in the sixth; the Khitan at the opening of the tenth, whose western branch, the Karakhitai, gave the name Cathay to the empire of the Mongols; the Ruchi, who overthrew the eastern Khitans, and founded the Kin dynasty of China; and finally the Manchu, who, during the Mongol supremacy, arose in the forest region of the Sungari, and, gradually gaining adherents, overthrew Mukden, and in 1644 established the reigning Ta-Tsin dynasty in China. From early times an emigration of Chinese into the valley of the Lian has been maintained. This has increased more and more during the last few centuries, and has reached as far as the Amur. The cultivation of the soil, to which the Manchus have never been given, has fallen into the hands of the Chinese, who have also introduced their language and culture. Politically, however, the country has remained distinct, being directly subject to the emperor; all civil and military posts, as well as the possession of the soil, remaining in the hands of the Manchus, of whom the army also is exclusively composed.

Manchuria thus stands as an intermediate link between China and the more distant kingdom of Korea, which in its turn forms a land-bridge in the direction of Japan. There have been few times apparently in which China, in the consciousness of being the central civilizing power, has not laid claim to Manchuria, as to all countries within the circle of her horizon. This claim has been justified when, as at present, a dynasty derived from the Tungus races has held the throne of China, or in the rarer cases when China herself has subdued those lands. A certain political, as well as racial, independence has, however, always been maintained, and has been fostered by the emperor in his own interests. His relations with Korea have been much more distant. They could only be drawn closer when China exercised an actual supremacy over Manchuria; and the claim that Korea has been a revolted state of China ever since, in the time of Wu-Wang (1122 B.C.), a prince of the previous dynasty fled thither and introduced agriculture and silk-production, can only be ascribed to the self-conceit of the Chinese.

Beyond this event, little is known of the early history of Korea. Among the numerous inroads made by Tungus races from the north, that of the Kauli, who subdued the whole land, and gave their name to it, was the most noteworthy. After this the heart of the land was little affected by these inroads, and the boasted

Mongolian conquest in 1264 can have had little solid foundation. An invasion by the Japanese in 1592 led to a five years' struggle, in which the Chinese were summoned to drive out the invaders, whose return home, however, was in the end occasioned by the death of their leader. Soon after, the isolation of Korea by the erection of the neutral zone took place, and the land has since borne the easy Chinese yoke, of which an annual interchange of presents and the maintenance of embassies on either side are the visible tokens.

It is interesting to observe the different ways in which the advent of European influence has affected the three peoples. China is a Colossus, which, in spite of change of dynasty, revolution, and other vicissitudes of fortune, has remained the same, and, with the exception of the coast districts, has been entirely untouched by intercourse with foreigners. The pillage of the Imperial Summer Palace did more than anything else to open the eyes of the rulers to the military superiority of Europeans, but in no single other particular was this superiority recognized, and even this defect was thought remediable by the introduction of European munitions of war, and instructors in their use. The requisite warlike spirit was not, however, to be supplied so easily, for the majority of the Chinese of the present day are wanting in every quality which goes to make a soldier. The merchant and trading classes, though possessed of some excellent qualities, need not be considered, as the army is not recruited from them. There remain the bulk of the working population —and as workers the Chinese are not to be matched; they are in the highest degree industrious, trustworthy, and contented with little—and the mandarins, both civil and military. The former do not, in the writer's opinion, at all deserve the ill name they have acquired in Europe. His relations with them have always been satisfactory, and on the whole the highest places are filled by the most fit. The same cannot be said of the military mandarins. The greater number are devoid of ambition, negligent in enforcing discipline, and fraudulent, especially in the particular of drawing pay for troops which do not exist. They exhibit defects which spring from the general characteristics of the nation, and unfit them for becoming good soldiers. The Chinese as a whole are wanting in active personal courage and chivalrous feeling. The inhabitants of the province of Hunan, truculent in disposition, and pre-eminent for their hatred of foreigners, undoubtedly make the best soldiers, and under good leading might supply a really effective contingent. This holds with still greater force of the Manchus, but it is hardly possible that the two races would combine for a common object. Even the best-drilled troops, who have never yet met an equally well-armed foe, would without doubt succumb to an opponent animated by a true war-like spirit.

Such an opponent is present in the Japanese. These are the exact opposite of the Chinese. Quick at seizing new ideas and adapting them to the peculiarities of their own temperament, they have transformed and carried forward on independent lines both the material and philosophical culture received from without. Thus they have of late years not only acquired scientific knowledge, but have also (in some cases) joined in the building up of the same; and in military affairs, too, they have shown the same readiness. With this is joined a chivalrous spirit, developed in the vicissitudes of the national history, an heroic devotion to duty, and an extraordinary readiness for self-sacrifice. Energetic in action, the Japanese show no trace of ferocity.

While the activity of the millions of China always keeps in the same groove, the modern history of Japan shows a constant inner development. Individuals and nation alike have been stirred by an ambition to advance, and, their own land being too small to give this ambition free scope, they have been compelled to look beyond the sea, and here the first land which presents itself is Korea.

In this country we find a race established which differs alike from Chinese and Japanese in features, speech, and writing. Whence it has come we know not. At the market of Kanlimon two types were observed: the one, to which belonged the merchants and officials, tall, well-developed, and intelligent, presenting a favourable contrast to the Chinese for the searching questions by which they manifested their thirst for knowledge; the other, including the working-classes as a whole, of small stature, with broad round Tungus faces, apparently inhabiting only the northern parts of the land. Those who have had the best opportunities of knowing the Koreans, speak highly of their fine physique, good manners, hospitality, and general culture. Whilst orderly and industrious, they are not given to excessive toil or arduous undertakings, and have no trading-instincts, but live an unambitious, contented life, ready to help one another, and attached to the land of their rulers. In the defence of their country they have shown a high courage and contempt for death. Still, the race has remained in a backward condition, which cannot be wholly explained by the want of fertility of the soil, and the attacks to which they have been exposed on both sides. Many elements of Chinese culture, *e.g.* silk production, the manufacture of porcelain, and cultivation of tea, in the transmission of which to the Japanese they have themselves acted as intermediaries, have been since lost; but that this is not due to want of intelligence is shown by the fact that, alone among their neighbours, the Koreans possess an alphabetic writing.

Korea has suffered, and not gained, by the advent of foreign trade, for the supply of the new wants developed thereby has drained the country, first of cash, and next of means of subsistence, there being no industries to supply other objects of exchange. In herself Korea does not possess the spirit of enterprise necessary to progress, nor is help to be looked for from China in this direction. From the influence, however, of an energetic race like the Japanese, who, in the present war, have shown that they have assimilated not merely the material advantages, but the humanitarian ideas of European civilization, both the material and moral elevation of the people might well ensue.

In the present war, the motives for which are now of small importance, China had the advantages of a land-route to Korea, while Japan could only send troops thither by sea. In the first engagements, however, between the opposing forces, the characteristics of the two nations at once made themselves manifest. Both by land and by sea the Chinese proved slow in their movements and wanting in any definite strategical plan. The Japanese showed themselves quick of attack, energetic in action, well disciplined, and well led; and this independently of the co-operation of Europeans, which was enjoyed by the Chinese at sea. A great contrast is visible, also, in the moral conduct of the war by the two combatants.

The results of uninterrupted success on the part of the Japanese cannot yet be estimated. The establishment of Japanese suzerainty over Korea would afford, as has been already said, what seems to be the only means of industrial development for the latter, and would coincide with the interests of the West-European powers. That the ambition of Japan would not stop here, but would attempt the subjugation of Manchuria also, is unlikely in view of the extent of Chinese settlement in that country. So long as the present dynasty reigns in China, the Manchus would resent any intrusion of a foreign power into their land, and in any case the difficulties in the way of its subjugation would be enormous. For China the taking of the capital might mean a change of dynasty, with the resulting violent convulsions, giving place in time to a condition of peace and new advance. To be beaten by Japan would be a more effectual lesson than if the victor were a European power, and would lead to the recognition of the fact that more is needed for the perfection of an army than the possession of warlike munitions. The advance would be slow, but military effectiveness would be the result.

The independence of the Chinese empire is unassailable. Even were Japan, as other Asiatic peoples have done ere now, to establish a prince of her land on the throne of Peking, the new dynasty would be in reality Chinese, as has been the case with the Mongolian and other rulers of the country, which would still remain the old Chinese empire. The saying of a former American resident at Peking was a correct one: if one tries to overthrow China, and inflicts on her what seem to be the deadliest wounds, it is all the same as if one whipped the sea.

THE MONTHLY RECORD.

THE SOCIETY.

Edward Gibbon as a Geographer.—Mr. Clements R. Markham, President of the Society, made the following remarks at the conclusion of the technical meeting held in the Society's map-room on November 19:—

"I cannot adjourn the meeting without alluding to the part we have a right to take in commemorating the centenary of that great historian, the author of the 'Decline and Fall of the Roman Empire.' Edward Gibbon was a member of the African Association, the only representative of a Geographical Society which existed in his time, and which eventually merged into our Society. We may, therefore, look upon him as one of ourselves. As an historian whose plan extended over so vast an area, Gibbon was of necessity a geographer. His readers know that D'Anville and the other great geographical writers of his century were his constant companions. His sketch of the geography of Arabia is a masterpiece of description, and numerous allusions prove his familiarity alike with the geographical writers of antiquity and with the travellers of his own time. Without such touches—as, for instance, his pictures of Syria, of Persia, of the Bosphorus, and of the Ukraine—his narrative would lose much of its clearness and still more of its charm. No one but a deeply read geographer could have written the 'Decline and Fall.' It is, therefore, the duty of geographers to add their tribute to the commemoration of the centenary of our associate Edward Gibbon, the illustrious historian, and accomplished student of geography."

The Session.—In addition to the papers already announced, it is hoped that early in the new year, Sir William Macgregor, K.C.M.G., the Administrator of British New Guinea, will give the Society an account of the extensive and important geographical work which he has accomplished during his six years' residence on the island. Sir William has been home for only a few weeks during the last twenty years, and his present stay will be of short duration. Mr. Aubyn Trevor-Battye will, at the meeting in December, give an account of the results of his observations during his long stay on Kolguef Island. Mr. H. J. Mackinder, M.A., has promised a paper, likely to be of interest, on "A

Geographical Analysis of the Position of Great Britain, and especially of London."

Christmas Lectures.—As already announced, the Christmas Lectures will this session be given by Dr. H. R. Mill, the subject being "Holiday Geography." There will be four lectures, as follows: 1. Maps as Holiday Companions. 2. Geographical Pictures, with special reference to Amateur Photography. 3. A Neglected Corner—the English Lakes. 4. A Geographical Holiday on the Edge of the Alps. All the lectures will be illustrated with limelight views—pictures, diagrams, and maps.

EUROPE.

The Daily Variation in the Discharge of Alpine Rivers.—At the recent Congress at Vienna, Dr. E. Brückner, of Bern, discussed some extremely interesting observations made under the direction of Mr. Epper, the chief of the hydrometric department of the Swiss Survey. Records of the level of the Rhone were kept at Sion, and at Port du Scex, just above the entrance to the Lake of Geneva, and these agree in showing a daily variation of level amounting, during August, to about 5 inches, or 66 per cent. of the whole discharge. The highest point was usually reached about 5 p.m., and the lowest about 8 a.m.; and it appears that at the former hour the upper Rhone is, in August, discharging two-thirds more water than at the latter. Obviously the cause is to be looked for in the increase of glacier water. It might be assumed that the great differences in the distances between the various glaciers feeding the Rhone and the points at which the measurements were made would cause so great variation in the times of high water at the latter, that the changes of level would be practically annulled by interference. But the rapidity with which the changes are propagated practically neutralizes this influence, and the flood from all the glaciers reaches the lake almost simultaneously. Similar variations of level have been noticed on the Aar, the Reuss, and the Rhine, and it may be supposed that they are common to all Alpine rivers, since the conditions required for interference are nowhere found to exist. An exception may, however, be made in the case of the Inn, where the distances from the glaciers are greater. During spring the diurnal variation in the amount discharged extends to rivers of the Lower Alps, and in winter to those of the hills and plains. Dr. Brückner's paper raises some points of considerable interest in relation to Dr. Forster's recent researches on the temperatures of flowing waters.

Nationalities in the Prussian Monarchy.—In a short article in *Petermann's Mitteilungen*, Prof. Supan reviews the various nationalities represented in Prussia according to the *data* furnished by the census of 1890. Language forms the basis of the classification, for, as the writer shows, the attempt made by v. Firck to deduce from the returns in this respect statistics as to the *races* represented, rests on some wholly arbitrary assumptions. The returns show a certain proportion of the population as speaking two languages (German and another), and the nationality of these is therefore uncertain, but as they only make up half per cent. of the total, it is sufficiently accurate for the purpose to assign them in equal proportions to the German and non-German elements. Those parts of the country are regarded as wholly German where over ninety per cent. speak this language; the population is considered "mixed" where the German element ranges from fifty to ninety per cent., and non-German where it sinks below half the total. It is, of course, only on the frontiers, as is well shown by a map which accompanies the article, that either the mixed or non-German population occurs. The latter is found in one province only (Posen), in three governments, and in sixty-seven "circles." In the extreme north-east a Lithuanian area occurs, but it is Polish (with its allies) which forms the most important foreign element, and one which shows a marked increase of late years in spite of constant emigration. Of the whole Polish population of Prussia, ninety-three per cent. occurs in seven adjoining governments, thus forming a very compact mass. Polish communities are also found in the neighbouring German districts, while Poles have settled in large numbers as artisans among the German population in the west. The Wends or Sorbs form a considerable proportion of the population in a few "circles" of Saxony and Silesia, principally in the country districts (fifty-seven per cent. in the *country* circle of Kottbus), and traces of them are still to be met with in Hanover. In the extreme north the Danes occupy a position analogous to that of the Poles in the east, and still form the bulk of the inhabitants in North Schleswig, though many have emigrated since they became liable to military service in 1884. The Frisians in the north-west are threatened with the loss of their language, but their secluded life in the fenlands keeps up their distinction as a race. Moravians and Czechs, and Walloons, occupy small areas in the south-east and west respectively. Of other European nationalities the Dutch occur in greatest numbers, practising various trades in the towns chiefly. More than half of the total live in the district of Düsseldorf.

ASIA.

Visit by Mr. Curzon to the Source of the Oxus.—On September 13, Mr. Curzon left Gilgit for the Pamirs, with a view to settling the disputed point of the real source of the Oxus. His plan was to proceed by the Kilik pass, and that called by former travellers the Wakhijrui, or Wakiji Kul, to the source of the Wakhan river, or upper course of the Panj, returning over the Baróghil pass and Chitral. In a letter dated from the latter pass on October 2, he informs us that he has visited all the so-called sources of the Oxus. The real source, that of the Wakhan, he considers to lie at the foot of the Wak-jir pass (this is the Kirghiz name, which, combined with that used by the Wakhis—Khujrui—has given rise to the appellation Wakhjirui) in a single glacier, and not in three, as reported by M. Dauvergne.* The true name of the Wakhan river is Wakh-jir (the Varjer of Littledale), from the pass above. Mr. Curzon reports that Lake Chak-Mak, at the source of the Ak-su, is wrongly delineated on our maps. He took with him both boiling-point thermometer and aneroid, for the determination of altitudes. On his return Mr. Curzon intended to pay a visit to Kabul, starting from Peshawur on November 12.

The Wazíri Country.—The Mahsud Wazíris who, early in November, attacked the escort accompanying the Wazíristán Boundary Commissioner, are the southernmost section of the great Wazíri tribe. They inhabit a part of the Suláimán range. The Gumal pass and the Takht-i-Suláimán lie to the south of their country. On the north and west are the Darwesh Kheyl Wazíris. Eastward lies the British district of Dera Ismáil Khán. The Mahsud country is rugged and difficult of access; a land of steep, high hills, narrow ravines, and streams that become torrents in the rainy season, working through the mountain range at right angles. Cultivation is confined to the plateaux at the foot of the higher mountains, to a few small valleys, and to strips of alluvial soil bordering the main ravines. These parts are terraced and watered by means of irrigation channels, cut, with no

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* Capt. Younghusband (*Proceedings*, 1892, p. 231) visited the source of an upper branch of the Wakhan—whether the main branch or not does not appear from his narrative—and found it to lie amid vast snow-fields and glaciers.

ıkill, out of the hillside. The fields are edged with rows of mulberry and
; and above them are the tribal villages. Of the Waziris generally, it is
tnat they are inveterate freebooters and blackmailers. The Mahsuds especially
t that, while kingdoms and dynasties have passed away, they alone of the
ıán tribes have kept their freedom; that the armies of kings have ever failed
penetrate to their strongholds; and that from time immemorial the plain
untry within a night's run of the hills has been a hunting-ground for their
The Wazíri horses are active, hardy animals, with a strain of Arab blood—
ult of thefts, it is said, from the army of Nadir Sháh. Among the
ıds live a small tribe known as Umars, whose speech is neither Persian
rashtu, and whose marriage ceremonies, general rites, and customary laws
unlike those of the Wazíris. The Mahsuds live beyond the British border,
time to time it has been found necessary to punish them for raids on our
and outrages on the last Afghán war, the Amír
Rahmán seve ; the Wazíris under his influence,
ıally rel ıed direction at the instance of Sir
ıer Dura In nderstanding arrived at when the
nd mission was has now been sent to demarcate a
dary-line betwee án, and the opportunity has been
for establishing a British outpost ıa, to the west of the Mahsud Wazíri
With a small force located her hoped that the tribe can be brought
r control. A full account of the with large-scale military maps of
country, may be found in the 'Rec xpeditions against the North-West
tier Tribes,' by Paget and Masor by authority in 1884. The official
zetteer of the Dera Ismail Kha ' (Lahore, 1884) may also be con-
ed; but for the general reader, 'A Border; or, Pathan and Biloch,' by
E. Oliver (London, 1890), may be nded.

AFRICA.

Madagascar.—In view of the contemplated French expedition in Madagascar, it may be useful to indicate some of the principal sources of information, both on the geography and history of the island. The Rev. J. Sibree has, perhaps, done more than any one else to make such information accessible to English readers. His paper, contributed in 1879 to the R.G.S. *Proceedings*, gives a useful summary of our knowledge of the island at that date, and the steps by which it had been acquired. This he supplemented in 1892 in his paper (also contributed to the *Proceedings*) on the Central Province and Capital, which is particularly useful at the present time as giving a description of the part of the island with which the proposed operations will be concerned. His book, entitled 'The Great African Island' (published in 1880), gives a general account of its geography and many interesting particulars as to its inhabitants and their customs, while in 1886 he brought out a useful bibliography. The 'Antananarivo Annual,' originally suggested, and in part edited, by him, contains various geographical papers, as well as translations from French accounts of the island. Capt. S. P. Oliver's work, published in 1886, brings together a large amount of information on its history and geography drawn from a variety of sources. Works and papers by Dr. Mullens, Mr. Deans Cowan, and others, may also be mentioned. Of French travellers and writers, M. Grandidier has done most of all to extend our knowledge. His map was the first to represent the whole island with any degree of accuracy, and besides various papers in the *Bulletin* of the French Geographical Society, he, in 1885, brought out his *Histoire de la Géographie de Madagascar.* His large work on the island treats chiefly of its natural history, ethnology, etc. He has lately given in the French *Bulletin* (vol.

xiv.) a summary of the work of French travellers in the island, with detailed maps showing all their routes.

M. Gautier's Explorations in Madagascar.—During journeys made within the past year between the capital and west coast of Madagascar, this traveller was able to collect a considerable amount of new information respecting the geology and surface features of the district lying between 18° and 21° S. lat. (*Annales de Géographie*, 1894, p. 499). Both geologically and orographically, the district is divided into zones running in the main north and south or parallel to the coast. The primitive rocks, which form the central elevated region, are divided from the sedimentary formations (limestones, red sandstones, etc.), disposed in bands between it and the coast, by a nearly straight line coinciding with the plateau escarpment. Amid the chaos of mountains which cover the surface of the latter, a general north and south direction of the ridges has been observed. A line of high ground, however, seems to run east and west, dividing the vast depression of the Onymainty to the south, from another probably existing to the north, as indicated by the break in the plateau-wall reported by Mr. Nilsen-Lund. It thus seems that, while the forces of compression have given to the island itself and to most of its ridges a north to south direction, movements of torsion have led to fractures running east and west. This idea is supported by the fact that just in the same latitude a break in the continuity of the sedimentary ridges further west occurs. These ridges are divided from the central plateau by a line of depression which runs from the coast at Nossi Bé in the north, through about two-thirds of the length of the island, being finally closed in by the Bara plateau to the south. This depression seems to be the hottest part of the whole island. The most important river of this part of Madagascar is the Tsiribihina, and its constant supply of water is due, apparently, to the regulating action of the lakes of its upper basin. M. Gautier's explorations show that its tributaries encroach on the basins of other rivers both north and south. The system of rains is not so regular here as in other parts of the island, the action of the monsoon being apparently modified by cold currents from the southern part of the Mozambique channel. Storms seem to come mainly from the interior. Vegetation also is distributed in zones parallel to the coast, the forests of the latter (favoured by the moist sea-breezes) giving place inland first to savannahs, with trees scattered regularly over the surface (one or two species predominating), and finally to grass-covered uplands of a dry and desolate aspect. A great part of these uplands forms an uninhabited zone separating the Hovas settled round the capital from the Sakalavas of the west coast, rather owing to the social and political state of the country than to unsuitability of the land for settlement.

The Dualas of the Cameroons and their Treatment of Disease.—Some notes on the customs of the Dualas in relation to sickness and death are supplied by Dr. F. Pleyn, civil surgeon in the Cameroons (*Mitt. aus Deutschen Schutzgeb.* vol. vii. part 2). Among this tribe the functions of the "medicine-man," or diviner, and those of the doctor are kept unusually separate. For the detection of persons supposed to have bewitched a sick man, the former, as usual, is consulted, and for this purpose makes use of a horizontal rod balanced on an upright pointed stake, the suspected persons standing in a circle around, the guilty one being pointed out by the rod, on coming to rest after being whirled round by the medicine-man. The results of the ordeal which follows are said to be never fatal, an emetic being administered in cases where vomiting does not otherwise ensue. The healing art is practised by both sexes, the knowledge of the proper remedies often passing from father to son, or mother to daughter. A small fee is paid for each consultation. The practitioners show no knowledge of surgery. After a death all the women in the village unite in singing dirges, which are in an old dialect now hardly understood. The grave (6 to 7 feet deep) is dug in the floor of the hut, which is subsequently still inhabited. The custom of placing food in the grave with the body seems never observed. The spirit of the deceased is supposed to hover round his abode for nine days, during which a watch is kept, lest he should be inclined to secure possession of his former property. After that length of time, he is supposed to repair to the interior of the Earth.

AMERICA.

Geography in the United States.—The last number of the *Bulletin* of the American Geographical Society bears witness to the rapidity with which geographical changes occur in the United States. Some of these changes do not appear to be for the better. The retirement of Professor Mendenhall from the post of Superintendent of the Coast and Geodetic Survey is more than a national loss, for his able administration had brought the work of that department into a state of efficiency which would bear comparison with that of the best official survey departments in Europe. His resignation, which cannot be too much deplored, is ascribed to "the unfriendly attitude of the Treasury Department (of which the Coast Survey is an attachment) in impeding the work of the bureau for the purpose of forcing his retirement, and in removing experienced and valuable assistants in order to make room for political spoilsmen." Professor Mendenhall is now president of the Worcester Polytechnic Institute, and Mr. William W. Duffield, "a gentleman who has had successful experience in constructing railroads," takes his place at the head of the Survey. Major Powell, who has directed the United States Geological Survey for thirteen years, has also retired, but retains his directorship of the Bureau of Ethnology. His successor on the Geological Survey is Professor Charles D. Walcott, an accomplished palæontologist. The reservations set apart for the exclusive occupation of the native Indians are gradually being restricted. The scenes at the settlement of Oklahoma by American citizens a few years ago may be expected to be reproduced in the "treasure vault of Utah," an area of 4,000,000 acres now occupied by the Uncompahgre and Uintah Indians. It was decided at the last session of Congress to throw this region open for settlement. It is surrounded by the Uinta, Wahsatch, and White River mountains, which exhibit some magnificent scenery. About sixty per cent. of the new land is said to be of agricultural or pastoral value, but the mineral wealth is expected to be most important. Congress has arranged for the cession by other tribes of parts of their reserved territory. The Yankton tribe of Sioux in South Dakota are giving up about 300,000 acres, the Nez Percé Indians in Idaho 500,000 acres, and the Siletz reservations in Oregon is to be reduced by 60,000 acres. While these transactions—presumably initiated on account of the diminution in numbers of the Indians—are going on in the States, an effort is being made, by the aid of a band of Laplanders, to teach the Indians of the territory of Alaska the use of the reindeer. The joint survey of the Alaskan frontier by United States and Canadian surveyors having been accomplished, the observations are now being worked out. The frontier with Mexico has also been resurveyed, and monuments erected at intervals along it for a distance of 700 miles. The old monuments were found to have been destroyed in several cases, and misplaced in others.

The United States Geological Survey.—The Geological Survey of the United States has recently extended the scope of its work in two directions, which afford striking illustrations of the practical benefits to be derived from national scientific undertakings. Special appropriations have been made to enable the survey to investigate the water-resources of the country, and it is proposed to establish a department whose function it will be to examine and report upon the materials available in different parts of the states for the construction of roads. The work of the first department is to apply the wealth of topographical and geological information collected by the Survey, and the climatic data in the records of the Weather Bureau, to the answering of inquiries from farmers respecting irrigation, from manufacturers respecting water-power or artesian supply, from municipalities as to town water-supply, and from politicians as to inter-state interests in rivers and streams. The large proportion of land in the hands of the general government amounting (excluding Alaska) to nearly one-third of the total area of the United States, makes a knowledge of the total available supply, and of the best methods of utilizing it, a national necessity, as appears from preliminary investigations already carried out by Major Powell, which show that in the west population has simply followed the streams, clustering round the base of the mountain ranges. Storm-floods and underground waters are still practically untouched, and these alone are available for the irrigation of arid and semi-arid districts. The researches of Professor King, whose memoir, published by the Weather Bureau, we noticed last year, gave a clear idea of the complexity of this subject when viewed from the meteorological standpoint alone, and the work of the Geological Survey will be sufficiently arduous, even with the large amount of voluntary assistance rendered by individuals and by the railway companies. The state of the average American road is sufficient evidence of the need for extending the scientific work already undertaken by the Massachusetts Road Commission. A national laboratory, which would report on the value of different materials for making roads, and on the resources of different states in rocks fitted for the purpose, ought to be of great value to the country.

AUSTRALASIA.

Mount Tarawera and Lake Rotomahana.—The appendices to the 'Report of the Lands and Survey Department of New Zealand' contain a number of papers of geographical and geological interest. Amongst these we may notice a letter covering some excellent photographs of the crateral lake of Ruapehu by Mr. Walter H. Dunnage, and a detailed report on the present state of the country immediately round the site of the eruption of Tarawera by Mr. S. P. Smith, the Surveyor-General. The last-named paper is important, inasmuch as it gives reliable data concerning the changes which have been in progress near Lake Rotomahana since the catastrophe of June 10, 1886. The whole of the surrounding country was at that time covered with mud and scoriæ ejected from Rotomahana and Tarawera, in some places to a depth of 200 feet. The composition of this deposit varies greatly in different places; on the mountain itself it is almost entirely composed of andesitic scoriæ, while around the lake it is chiefly sandy mud, with scoriæ distributed through it. The former is not subject to much change, as it allows water to percolate freely; but the latter is extremely compact, and forces the water to find a way over its surface, where it has cut deep furrows and carried down immense masses of material from the hillsides to the valleys. This process has already been carried to such an extent that flats have been formed of even greater area than existed before the eruption, and it is now only possible to pass over the country by keeping to the main ridges, which are often too narrow to walk along. Through the mass of mud the fine scoriæ ejected from Tarawera is found in large quantities, either deposited in thin strata, or scattered irregularly through the whole; and it appears certain that in process of time this deposit will harden and form a rock indistinguishable from the ordinary volcanic breccia. One of the most curious features is the rapidity with which these changes are taking place: gorges 100 to 150 feet deep have been excavated during the last eight years by the action of mud-charged water, a process which would take ages under ordinary circumstances. Where the deposit is deep and circumstances are favourable, vegetation in the shape of Scotch thistle and fern is beginning to show itself; and where the deposit is thin, the fern seems to grow with greater luxuriance than formerly.

Bougainville Island.—There is an interesting and brightly written account of a journey to Bougainville Island (Solomon Islands) by Herr C. Ribbe in *Globus*, vol. 66, No. 9. His New Pommeranian friends sketched his fate as a human sacrifice before he left; but he found that, while white heads were worth more than black ones, white flesh was held to be too sweet for the native palate, and that cannibalism had disappeared from the shores bordering Bougainville Straits. He spent nearly five months on Shortland Island, and visited the shores of Bougainville. The natives, who probably are allied to the Malays, are very numerous on the low-lying ground, and form many clans, each living in its own village, where the houses are built on any knoll or rock, and at some distance from each other. They trade freely with the whites, but have little conception of value, giving thirty coconuts for a Jew's-harp worth three-halfpence, fifty for a fourpenny knife, or a hundred for a shilling hatchet. The whites have a revolver handy while the bartering is going on, but no trader has been harmed in any way by these coast people during the past ten years. The shore tribes trade at great profit with the hill tribes, who are not familiar with white people nor afraid of firearms, so that it is dangerous to penetrate far into the interior without good recommendations and a sufficient escort. The natives are still in the stone age, but are very skilful with arrow and lance. They are given to adorning their naked bodies, and love to play and dance. The women do most of the work. The products are taro, yams, sweet potatoes, bananas, coconuts, and some tobacco and betel-nuts. Herr Ribbe ends with a glowing description of the possibilities of these islands, and the profitable paradise they might become for German planters.

Geology of Torres Straits.—A paper on the geology of Torres Straits, by Professors Haddon, Sollas, and Cole, is published by the Royal Irish Academy (*Transactions*, vol. xxx. pt. xi.). Professor Haddon spent several months in New Guinea, and had an opportunity of continuing the study of the geological formation of the numerous islands of Torres Straits, which had been begun by Jukes. These islands may be conveniently divided into three groups, the Eastern Volcanic Islands, between 143° 29′ E. long. and the edge of the great Barrier Reef, including Mer (Murray Island), the largest, Uga and Erub; the central Coral Islets between 142° 48′ and 143° 29′ E. long.; and the Western Islands, which are more or less related to the Queensland axis. The last group includes Mabuiag, the Prince of Wales, and Banks Islands, the delta islands formed by the detritus of the rivers of New Guinea, and a number of small rocky islands, including Nagir (Mount Ernest), Saddle Island, and Dauan (Mount Cornwallis), scattered between Cape York and New Guinea. Mabudauan Hill, once a similar island, has been connected with the mainland of New Guinea by the encroachment of the delta of the Fly river. The mountain chain of Eastern Australia, called by Suess the Australian Cordillera, is continuous through Nagir, Saddle Island, Mabuiag, Dauan, and Mabudauan Hill (in the Western group), with the mountains of New Guinea to the north, and those of Tasmania to the south. The Owen Stanley range in New Guinea is probably an offshoot of this great chain, extending over 35° of latitude. From this theoretic centre would radiate Cape Lotus and Gautier mountains (west-north-west), the Australian Cordillera (south), and Finisterre and Owen Stanley range (east-south-east), extending into New Britain and the Louisiade islands. There is considerable support for this hypothesis in the resemblance in geological structure. The Owen Stanley range, as far south as Mount Suckling, consists largely of slates and schists, resembling those of the Australian Cordillera. Their strike is not known, but it is probably a continuation of the east-north-east strike of the mountains of the d'Entrecasteaux and Louisiade groups, islands which are undoubtedly the partially submerged prolongation of Eastern New Guinea. The Eastern islands, Mer, Uga, and Erub, are of recent origin, due to the restless volcanic activity of the Pacific "Zone of Fire." They lie on the extremity of the submerged ridge which continues the North Island of New Zealand through Norfolk Island, Avon Island, and other islets of the Coral Sea, and forms the western boundary of Carpenter's Deep. New Caledonia, included by Suess, is rather parallel to this axis than a member of it, being partially separated by the Gazelle Deep. There is a certain resemblance between the conditions of this area and those of Southern and Central Europe in Triassic times. The ancient mountain-chain represented by the peninsula of Hyères, the mountains of Auvergne, the Vosges, Schwarzwald, Bohemia, the Sudetic and Southern Russia correspond with the Australian Cordillera, while the dolomites of Tyrol, with their associated coral and volcanic formations, represent the reefs of the Coral Sea.

POLAR REGIONS.

Mr. Trevor-Battye's Visit to Kolguef Island.—We are happy to learn that Mr. A. Trevor-Battye and Mr. Hyland, his bird-stuffer, to whose detention on Kolguef Island we referred last month (p. 462), have safely returned. Telegraphing from Archangel, Mr. Trevor-Battye explained that he met a large party of Samoyedes on the island, with whom he lived until the Russian traders who arrived during his stay were ready to return to the mainland. They left Kolguef on September 18, the island being covered with snow long before the usual time, and, on account of the stormy weather, took refuge in Kolokolkova Gulf, where the vessel grounded 2 miles from land, and it was several days before she was warped to shore. Four days in sledges brought Mr. Battye to the Pechora, and three days in a boat to Ust Tsilma. From this village he and Mr. Hyland made their way with extreme difficulty to Archangel, the tundra being in the worst possible condition for travelling, and the rivers, still unfrozen, being almost impassable with floating ice. Mr. Trevor-Battye was able to make extensive collections of birds and plants on Kolguef. He found that the coast-line of the island no longer corresponds with that shown on the chart, and the whole island appeared to be a mass of fluviatile deposit, beneath which no massive rock appeared. Travelling on the island was very rough, on account of the swamps and the irregular surface of the higher ground, which was cut up by ravines partially filled with snow. The weather was usually bad, northerly winds prevailing, accompanied by much rain and fog. Mr. Trevor-Battye has returned to London.

Captain Wiggins.—As we are going to press news has been received of Captain Wiggins, who, it was feared, must have been caught by the ice on his return voyage from the Yenesei. A telegram from Vardö, on November 3, announced the departure thence of the s.s. *Lindesnaes* for Yugor Straits, with a large supply of provisions and clothing, in order to assist him if possible. The vessel took out picked men and interpreters for land expeditions along the coast, should no news be obtained of Captain Wiggins at Khabarowa. On November 17, a telegram from Archangel announced, "Wiggins wrecked, Yugor Shar. All on board safe." This probably indicates that the *Lindesnaes* had succeeded in her mission.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Ocean Currents in the Roaring Forties.—A note by Mr. H. C. Russell is published in *Nature*, No. 1306, mentioning the result of some experiments with floats thrown overboard in the Southern Ocean. One float thrown in near the Crozet Islands in March, 1893, was found in September, 1894, on the Australian coast between Cape Banks and Cape Northumberland. Its mean daily drift must have been at least 8 miles. Two other floats travelled in nearly the same track, and their records gave rates of 6 and 9 miles a day respectively. The float that made 6 miles a day was protected by a heavy frame of wood, but, without particulars as to how much of the floats was immersed, it is impossible to say what effect this should have had on its rate of movement. The result shows a general west-by-north drift, which corresponds to the northerly component of the Antarctic current, rather than to the direction of the prevailing "brave west winds."

New Method of determining the Density of Sea-Water.—We have already noticed the experiments of Dr. Krümmel in connection with the application of an optical method, more practicable than the clumsy refractometers hitherto experimented with, to the determination of the density of samples of sea-water, and practical oceanographers will be glad to learn that these have been brought to a successful issue. In the July number of the *Annalen der Hydrographie*, Dr. Krümmel gives a full account of a modified refractometer, devised in co-operation with Professor Abbe of Jena, which he has already subjected to extensive trials, with gratifying results. Two rectangular prisms, one fixed to the body of the instrument, and the other movable, have their hypothenuse surfaces divided longitudinally into equal parts by a deep groove. On one half of the surface is placed a drop of distilled water, and on the other a drop of the sea-water under investigation—mixture being prevented by the groove just mentioned. The difference of the angles of total reflection of the two liquids is then measured on the micrometer scale of a small telescope magnifying some twenty-fold, the boundary between the dark and illuminated parts of the scale being defined for ordinary white light by an Amici prism. Dr. Krümmel's difficulties have arisen, not so much in devising a convenient form of instrument as in freeing the results of observation from errors due to variations of temperature, but these have been satisfactorily overcome, and the constants for reducing the observations are determined once for all for each instrument. Professor Krümmel finds that with a little practice it is possible to determine densities to the fourth place of decimals, equivalent to 0·1 per mille of salinity. It is scarcely possible to over-estimate the service Professor Krümmel has done to workers in this branch of science. Temperature observations have hitherto been the only guide by which to work at sea when relatively small differences of physical condition had to be observed; but with the new instrument good salinity observations can be obtained at once with a sample of two or three drops, no matter how heavy a sea may be running. The moderate first cost of the instrument (about £6), its unbreakableness, and the simplicity of its action, make it not beyond hope that it may be a useful addition to the deep-sea lead in navigation.

GENERAL.

Geography at the Congress of German Scientists in Vienna, 1894.—The sixty-sixth meeting of this Congress, since its foundation at Leipzig in 1822, was held in Vienna from the 24th to the 30th of September of this year. For the first time, a special section was devoted to geography, and another opportunity (the third during the past four years) was afforded German specialists in geographical science of meeting in the Austrian capital. The number of papers presented was twenty-two, or, if we include two sub-sections specially occupied with geodesy and cartography and with meteorology, thirty. The president of the section was Dr. A. Penck; the vice-presidents, Drs. Neumayer (Hamburg), O. Lenz (Prague),

E. Brückner (Bern), S. Günther (Munich), and von Wieser (Innsbruck), while the sub-sections were presided over by Major-General von Arbter and Dr. J. Hann. Most of the papers dealt with geographical morphology, oceanography, or climatology. Dr. O. Lenz discussed the functions of the termite in tropical countries in producing humus, and in transferring it from one place to another. The analogy with the work of the earthworm as expounded by Darwin was developed along the lines suggested some years ago by Professor Drummond, and at a much earlier period by Dr. Livingstone. Mr. M. Cvizić (Belgrade) gave an account of natural excavations in the calcareous mountains of Austria, in which he classified twenty-three cavities recently examined into those cut out by streams and those formed by the solvent action of drainage water. The former are distinguished by the presence of boulders and detritus, and the latter by their absence and the appearance of small channels at the bottom. Cavities of the second class are frequently filled up with decomposed clayey products or metallic deposits, and four natural bridges turned out to be remains of such cavities. Mr. H. Crammer (Wiener-Neustadt) described the "Tablerloch," an ice-cavity at Wiener-Neustadt, and accounted for the low temperatures observed in it during summer by the retention of the winter cold in the underlying rock, ascribing to a similar cause the curious fact that at certain periods in winter temperature in the cavity rises faster than it does during summer. The complex structure of the ice in the interior of the cavity was ingeniously explained by supposing that during thaw the ice cracks along lines perpendicular to its surface, forming small columns either through contraction or crystallization. Dr. E. Richter (Gratz) gave a demonstration illustrating the formation of "kaare," or corries, the easy-chair-shaped depressions found on mountains of the old crystalline formations. Although these always occur near the scene of glacial action, they cannot be ascribed to its influence, and Dr. Richter gives the first place to simple weathering, which would naturally be greatest during a glacial period. At elevations less than 6500 feet water-erosion is undoubtedly the most active, but above that height the chief agent of denudation is the atmosphere. Dr. K. Haas (Vienna) exhibited an apparatus illustrating Sir Robert Ball's theory of an ice age, and Dr. E. Reyer (Vienna) models showing the modes of deformation of the Earth's crust, with special reference to the processes of mountain-building. Dr. F. Lucksch (Fiume) described the relief of the floor of the eastern and central Mediterranean, the result of soundings taken during the four expeditions of the *Pola*. Amongst the communications relating to geographical morphology, we may notice Mr. P. Oberlercher's large model of the Glockner group, a remarkable achievement in which geographical and geological features are represented with the greatest detail, accuracy being ensured by reference to no less than 382 fixed points. In the subsection of oceanography, Dr. Neumayer read a paper on the currents of the Pacific Ocean, dealing specially with the material collected by the Deutsche Seewarte for their new sailing directions for the Pacific. In the course of his paper, Dr. Neumayer took occasion to emphasize the need of reforms in the methods of nautical astronomy. In an account of a cruise on the *Taurus*, Dr. K. Natterer explained the grounds of his conclusion that, from a chemical, physical, and biological point of view, the Sea of Marmora is to be classed, not with the Black Sea, but with the Mediterranean. The results of a Russian expedition which left Sebastopol about the end of last September should give additional light on this point. Dr. E. Brückner (Bern) discussed some new facts as to the daily variations in the discharge of Alpine rivers; and Dr. S. Günther (Munich) described experiments and calculations dealing with the mode of mixture of different currents of water, such as occurs at the confluence of rivers. Several of the papers are referred to at greater length in separate notes.

OBITUARY.

Rear-Admiral John William Pike.

REAR-ADMIRAL John William Pike, who died on July 21, entered the Royal Navy in 1842, and obtained his first commission as a reward for the excellent manner in which he passed his examination at the Royal Naval College. He served as gunnery lieutenant of the *St. Jean d'Acre* under Captain the Hon. Henry Keppel in the Baltic and Black Sea from 1853 to 1855, and from 1855 to 1856 he commanded the *Banshee* in the Black Sea, and was present at the capture of Sevastopol and Kimburn. He received the Crimean, Turkish, and Baltic medals. He then commanded the *Antelope* from 1856 to 1859 on the West Coast of Africa, was promoted in 1860, and commanded her Majesty's ship *Vigilant* on the home station and her Majesty's ship *Devastation* in the Pacific from 1862 to 1865. He then served as inspecting commander of the Coastguard from 1865 to 1867, was posted in 1868, and obtained flag rank in 1885. He married, in 1865, Jane Roberts, eldest daughter of Mr. John Brown, F.R.G.S., and F.R.S.N.A., Copenhagen. He leaves surviving three sons, all of whom hold commissions in her Majesty's service. Admiral Pike had been a Fellow of the Society since 1852.

Mr. William John Steains.

It is with much regret that we announce the death of this young and talented explorer at Opobo, West Africa, on November 3, at the age of thirty-one years. When quite a boy he developed a great love and desire for foreign travel and ethnological study, and at the early age of eighteen years went to Brazil, in connection with an engineering undertaking in the formation of the Alagoas Railway. Having accomplished his duty as clerk and draughtsman in that direction, he proceeded, in his twenty-second year (from "pure love for the calling," and under his sole management and expense), to form an expedition to explore the Rio Doce and its northern tributaries, with a view to collect fresh geographical and ethnological information. This expedition occupied between seven and eight months. On January 16, 1888, Mr. Steains read his paper before the Society, and exhibited maps of his own compiling, together with a large collection of original sketches and ethnological curios, which he brought from this district. In recognition of this exploration, he was awarded the "Back" premium by the Council. In 1891 he proceeded to the West Coast of Africa, being appointed a consular agent in the Oil Rivers Protectorate (now known as the Niger Coast Protectorate). He was one of the first party that went out under Sir Claude MacDonald's administration. His health suffered severely from the effects of the climate, but nevertheless, his great energy of character induced him to return again in September last. Unfortunately, Mr. Steains succumbed to the climate a few weeks after his arrival. He was held in great esteem by all who knew him, both for his sterling character and uniform courtesy and good nature.

M. Dutreuil de Rhins.

Further information has been received regarding the death of the eminent French explorer, M. Dutreuil de Rhins,* who was murdered by Tibetans in June last. A letter from his travelling companion, M. Fernand Grenard, dated Sining,† July 26,

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* *Geographical Journal*, September, 1894, p. 276.

† Hsi-ning Fu, the chief town in Western Kan-su. The Chinese Amban residing here is controller-general of the Koko-Nor region.

1894, gives a long account of this lamented affair. According to the summary printed in the *Journal des Débats*, the two travellers, after leaving Cherchen,* in August, 1893, crossed the mountain ranges of northern Tibet. "Our work there," M. Grenard writes, "no convict would have done." He goes on to say that they discovered the sources of the Me-Kong and Yang-tse-Kiang; † a statement which cannot be accepted as literally correct without further inquiry. However, it appears that, on June 2, MM. de Rhins and Grenard reached Ton-Budha,‡ a place said by the latter to be situated on the Yang-tse. Here for the first time the Tibetans § were unfriendly; and on June 5, just as they were leaving, they were fired upon. The road ran in front of the village, and along the face of the hill. To the right rose a wall of rock; to the left and below, ran a torrent. Above and beyond for about 1500 yards were houses, with loopholes through which muskets were pointed. M. de Rhins was wounded in the stomach. M. Grenard did what he could for him under the enemy's fire, but had to run on to the caravan for a litter. Some two hundred Tibetans then charged down on the caravan before it could be placed in a state of defence, plundered the baggage, seized all the arms, stripped the two Europeans, and then drove M. Grenard and his followers down the valley, refusing, however, to let his wounded leader go with him. On the same day, M. Grenard states, M. de Rhins was thrown into the river || with his hands and feet tied. M. Grenard was compelled to retreat by the enemy's fire; and reascending the river, he reached Tabu Gufa,¶ where he was kindly received by a Chinese soldier and by the lamas. He next went to the Chinese officials at Kierkoudo (*sic*) or Yekundo; ** but the remonstrances they addressed to the lamas at Ton-Budha were of no avail. M. Grenard also succeeded in enlisting the sympathies of the chief lama of Dza-Chuka or Chinga,†† who, finding threats ineffectual, was preparing to make a raid on Ton-Budha, on the pretence of compelling the people there to respect the authority of the Chinese emperor. M. Grenard, however, dissuaded him; being of opinion, we are told, that to countenance any such enterprise would be derogatory to his own position as the representative of a civilized government.

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* Marco Polo's Charchan, in Chinese Turkestan; visited by Prjevalsky in 1884 (*Proceedings* R.G.S., 1885, p. 810).

† "We were now (June, 1892) in the basin of the Murus, the head-waters of the Yang-tse-Kiang.... Twice we crossed the Murus, the second time so near its source that we could see, a few miles away, the little rivulets dashing down out of the snow-clad mountains" (Rockhill, *Geographical Journal*, iii. 370, 371).

‡ According to A—— K——, the village of Thom-Buddha, spelt Tam-Boudha on M. de Rhins' large map, is situated ten miles north of Kegudo and a few miles west of the Di-chu, or Upper Yang-tse. In the Society's map of Tibet, only the adjacent lamasery, Rakna Gomba, is marked. Mr. Rockhill, who followed this route from Sining to Jyé-Kundo (Kegudo) in 1889, makes no mention of Ton or Thom-Buddha.

§ In earlier reports they were spoken of as the "Great Red-Hoods." The red-capped lamas (Dja mar) are specially numerous in Dérgé, the district immediately to the south of Jyé-Kundo ('Land of the Lamas,' p. 217).

|| In the earlier report this was explicitly stated to be the Tung-Tien river. The Chinese call the Dré Chu, Murus, or Upper Yang-tse the T'ung-t'ien ho, River of all Heaven ('Land of the Lamas,' p. 196).

¶ Possibly A—— K——'s Tuden Gomba, Thuden Gomba on M. de Rhins' map, which Mr. Rockhill suggests may be Ch'üdé Gomba ('Land of the Lamas,' pp. 201, 227).

** Mr. Rockhill says that the name Kegudo was not recognized, and that Jyé-Kundo is the real name of this important town.

†† Possibly the lamasery of Changi Gomba, a few miles south of Jyé-Kundo ('Land of the Lamas,' p. 206).

His only object had been to obtain possession of his late chief's body, and to recover articles of value that had been stolen. Having failed to compass this, he started toward the end of June for Sining, where he arrived on July 15, with his followers, and was welcomed by the Chinese commissioner, who supplied his wants. M. Grenard states that he made a survey of the route from Kegudo to Sining, which had not previously been followed by any European. It will be interesting to compare the result with Mr. Rockhill's very careful observations. Miss Taylor, it may be noted, also reached Jyé-Kundo, or Kegudo, from Kan-su.

CORRESPONDENCE.

Canal and Port of Saint Louis du Rhone.

Apropos of the note in the September number of the *Journal*, p. 269, I should like to state the following facts:—The canal which was opened in 1870 near the old tower of Saint Louis, between the left bank of the Rhone and the gulf of Fos, thus called from the ancient *Fossæ Marianæ*, gives access to a port now taking rank, in amount of tonnage, as the third French port on the Mediterranean coast; after Marseille and Cette, it takes precedence before all others on the long shore-line between Spain and Italy. The regular tonnage of ships with full cargo exceeds 250,000 tons, and, besides, a fleet of steamboats runs up and down the river between Lyon and the quay of Saint Louis. The trade, especially active with Algeria, consists in cereals, cattle, iron ore, marbles, wool, coal, petroleum, and other heavy merchandize. A few industrial establishments and warehouses already surround the docks, covering a surface of 14 hectares (35 acres) and joining the sea by a canal of 3300 metres in length. The ships drawing from 5 to 6 metres easily enter the canal and port; but till recently there was great danger that the alluviums carried by the Rhone, and taken up by the west wind and sea-current, would entirely silt up the gulf of Fos, and necessitate a continuation of the canal through new-formed mud-banks. But the danger was in a great measure obviated in 1893 by the artificial opening of a new mouth of the Rhone, the "grau de Roustan," which carries to the west, that is, to the opposite side of the delta, the muddy waters of the mighty stream. Grave fears were formerly entertained on the possibility of the rising town to resist the baneful influence of malaria; but during the last twenty years, mortality has been always lower in proportion there than among the inhabitants of Arles, to which commune it belongs.

Elisée Reclus.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1894–95.

First Ordinary Meeting, November 12, 1894.—Clements R. Markham, Esq., c.b., f.r.s., President, in the Chair.

The President made the following remarks:—

Fellows of the Society, in opening our sixty-fifth Session it is my first duty to remind you how much we are indebted, and have been indebted during a long course of years, to the Senate of the University of London, for the permission to hold our meetings in this hall, and I feel sure that we all appreciate the kindness and liberality of that enlightened body in having allowed us the use of the hall for now twenty-four years. I have pleasure in announcing to you that considerable alterations and improvements have been made in your premises at No. 1, Savile Row, during the recess, mainly with the object of promoting the convenience and comfort of those among the Fellows who come there for information or for study. It is my earnest hope that a greater use will be made of our splendid Geographical library and of our collection of maps than has hitherto been the case. I would invite the Fellows of the Society to pay a visit to our rooms and see what conveniences and comforts have been provided for them there. I also have to announce that during the ensuing session it has been arranged that there will be meetings to discuss subjects connected with Geography, of a technical or scientific character, which are not adapted for popular meetings, in the map-room on afternoons which will be announced, and although the papers and discussions will generally be somewhat of a special character, you will be invited to attend, and I trust many of you will do so.

ELECTIONS.—*Cameron Corbett Cannell*; *Isaac James Green*; *Walter Parsons*; *William Barclay Squire.*

The Paper read was:—

"British Central Africa Protectorate." By H. H. Johnston, Esq., C.B.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Austria—Bohemia. **Baker.**

Pictures from Bohemia, drawn with pen and pencil. By James Baker. London, the Religious Tract Society. Size 11½ × 8, pp. 192. *Map and Illustrations. Price* 8*s*. *Presented by the Publishers.*

The illustrations are well selected, and give a vivid representation of much of the characteristic scenery and many of the quaint costumes of Bohemia.

Caucasus. **Mourier.**

Guide au Caucase. Par J. Mourier. Paris, J. Maisonneuve, 1894. Size 7½ × 5, pp. xxiii., 219, and 202. *Maps. Price* 10 *francs.*

A good general account of the Caucasus, which should be very useful to the tourist, supplying all information as to hotels, modes of travelling, etc., which he is likely to require.

England and Wales—Gazetteer. **Brabner.**

The Comprehensive Gazetteer of England and Wales. Edited by J. H. T. Brabner. [Vol. III., Gob—Les.] London, W. Mackenzie [not dated (1894)]. Size 10½ × 7½, pp. 360. *Maps, Plans, and Plates. Price* 10*s. Presented by the Editor.*

France. **Baring-Gould.**

The Deserts of Southern France: an Introduction to the Limestone and Chalk Plateaux of Ancient Aquitaine. By S. Baring-Gould. 2 vols. London, Methuen and Co., 1894. Size 9 × 6, pp. (vol. i.) xxii. and 296; (vol. ii.) xii. and 303. *Illustrations. Price* 32*s. Presented by the Publishers.*

Mr. Baring-Gould has conferred an obligation of no small weight on the tourist world. His two handsome volumes give an account in word and picture of one of the most remarkable and least-appreciated regions of Europe, and he not only describes, he explains and interprets, the country of which he treats. Commencing with an account of the Causses, he avails himself fully of M. Martel's recent contributions to underground geography; then he treats of the historical aspects of the caves of south central France from the time of their prehistoric tenants, and with this as a text diverges far over the field of folk-lore, returning again to the facts of more recent history and the personal interests of this land full of memories. Mr. Baring-Gould claims for his book that it is a preparation for intending visitors, not a substitute for personal study of the country.

German Empire—Gazetteer. **Neumann.**

Neumann's Orts-Lexikon des Deutschen Reichs. Ein geographisch-statistisches Nachschlagebuch für deutsche Landeskunde. Dritte, neu bearbeitete und vermehrte Auflage, von Wilhelm Keil. Leipzig and Vienna, Bibliographisches Institut, 1894. Size 10 × 7, pp. xlii. and 1034. *Maps and Plans. Price* 15*s.*

Ireland. **Sanderson and Finlay.**

The Story of Saint Patrick, with a sketch of Ireland's Condition before and after Patrick's time, by Joseph Sanderson, D.D., etc. Ireland and the Irish, their Christianity, Institutions, Missions, Mission Fields, and learning from the earliest times, with an Appendix, by John Borland Finlay, PH.D, etc. Boston, Mass., W. L. Richardson & Co. New York, Wilbur B. Ketcham, 1895 [1894]. Size 10 × 7½, pp. 286, and xiii. and 264. *Presented by the Publishers.*

This volume contains two books by different authors on different subjects, differently paged, but bound together. The first is a biography of St. Patrick, with some references to the early state of Ireland. The second is an ecclesiastical history of Ireland, containing much controversial matter.

ASIA.

British Colonies in Eastern Asia. **Chailley-Bert.**

The Colonization of Indo-China. Translated from the French of J. Chailley-Bert. By Arthur Baring Brabant. London, A Constable & Co., 1894. Size 8 × 5½, pp. xxiv., 389, and 12. *Maps. Price* 7*s.* 6*d. Presented by the Publishers.*

The original work has been already noticed in the *Journal*. The translation is very well produced, and is illustrated by maps of the colonies referred to—Hongkong and the province of Burma.

China. **Fielde.**

A Corner of Cathay: studies from life among the Chinese. By Adele M. Fielde. New York and London, Macmillan & Co., 1894. Size 8 × 6, pp. viii. and 286. *Illustrations. Price* 8*s.* 6*d. Presented by the Publishers.*

An unusually interesting record of Chinese customs and beliefs as they presented themselves to the author during fifteen years of residence in Swatow and the neighbouring parts of China. The book is beautified by a number of finely executed reproductions in colour from Chinese artists.

India—Historical. *B.S.G. Lisboa* 13*a ser. No.* 8 (1894): 587–743. **Rivara.**

Inscripções lapidares da India portugueza, transciptas por J. H. da Cunha Rivara.

A collection of inscriptions from tombstones and other memorials dating from the sixteenth and seventeenth centuries in the Portuguese possessions in India.

Tibet. **Rockhill.**

Driven out of Tibet. An attempt to pass from China through Tibet into India. From the *Century Magazine*, April, 1894. Size 10 × 7. *Illustrations.*

Western Asia. **Tiele.**

Western Asia, according to the most recent discoveries. Rectorial Address on the occasion of the 318th Anniversary of the Leyden University, February 8, 1893. By C. P. Tiele. Translated by Elizabeth J. Taylor. London, Luzac and Co. Size 8 × 5½, pp. 40. *Price* 2*s.* 6*d. Presented by the Publishers.*

This address is not happily entitled. 'The History of the Early Peoples of Western Asia,' would convey more nearly the aspect of the subject put forward by the learned professor.

AFRICA.

Abyssinia—Sabæans. **Glaser.**

Bemerkungen zur Geschichte Altabessiniens und zu einer sabäischen Vertragsinschrift von Dr. Eduard Glaser. Saaz, S. Glaser's Söhne. Size 9 × 6, pp. 26. *Price* 60 kr. *Presented by the Author.*

Cameroons. *Verh. Ges. Erdk. Berlin* 21 (1894): 369–379. **Passarge.**

Herr Dr. Passarge: Bericht über die Expedition des Deutschen Kamerun-Komitees in den Jahren, 1893–94.

Cape Verde Islands. **Kettle.**

A Description of the Cape Verde Islands. To accompany the Chart. Fifteenth Edition. By William R. Kettle. London, R. H. Laurie, 1894. Size 8½ × 5½. *Presented by the Author.*

Dahomey. *Tour du Monde* 68 (1894): 65–128. **Albéca.**

Au Dahomey. Par M. Alexandre L. d'Albéca.

In his capacity as a French colonial official, M. d'Albéca took part in the military operations in Dahomey, and the narrative of his journey with the expeditionary force, includes an account of the occupation of Abomey, with some ghastly illustrations.

Egypt—Nile. ———

Reservoirs in the valley of the Nile. Prepared for the Committee of the Society for the Preservation of the Monuments of Ancient Egypt. London, 1894. Size 9 × 6½, pp. 16. *With a Map.*

A plea for delay in deciding on the plan of establishing a great Nile reservoir in the valley of the river itself, where, whatever the site adopted, a large number of interesting sites must be flooded.

Egypt—Nile valley. *J R.I. British Architects* 1 (1894): 605–609. **Naville.**

The threatened destruction of Philæ—A protest. By Monsieur Edouard Naville.

Egyptian Deserts. *Cosmos* 11 (1892–93): 260–283, 315–333. **Menicoff.**

Ricognizione nel Deserto Orientale d'Egitto. Eseguita durante la Spedizione Napoleonica dall' Ing. Bertre nel 1800. Da un Manoscritto inedito della Biblioteca del Re a Torino. Ricerche ed appunti del dott. Ulrico Menicoff.

This hitherto unpublished record of the observations of one of Napoleon's engineers during the Egyptian campaign is of considerable interest in throwing light on the condition of the eastern desert of Egypt at that time.

Eritrea. *Verh. Ges. Erdk. Berlin* 21 (1894): 379–430. **Schweinfurth.**

Herr G. Schweinfurth: Ueber seine letzte Reise mit Dr. Max Schoeller in der Italienischen Erythræa.

French West Africa—Bondu. *B.S.G. Com. Bordeaux* 17 (1894): 433–463. **Rançon.**

Le Bondou. Etude de géographie et d'historie soudaniennes. Par le Dr. Rançon.

Illustrated by a large sketch-map of Bondou, on the Senegal river, on the scale of 1 : 500,000.

Matabililand. **Donovan.**

With Wilson in Matabeleland; or, Sport and War in Zambesia. By Captain C. H. W. Donovan. London, Henry & Co., 1894. Size 9½ × 6, pp. XIV. and 322. *Maps and Illustrations. Presented by the Publishers.*

The book is divided into "Sport" and "War," the former recounting hunting-exploits between Cape Colony and the Zambesi, the latter describing the Matabili campaign, in which Captain Donovan took part.

Matabili War. **Wills and Collingridge.**

The Downfall of Lobengula: the Cause, History, and Effect of the Matabeli War. By W. A. Wills and L. T. Collingridge. With contributions by Major P. W. Forbes, Major Sir John C. Willoughby, Bart., Mr. H. Rider-Haggard, Mr. F. C. Selous, and Mr. P. B. S. Wrey. London, *The African Review* Offices, and Simpkin, Marshall, and Co., n.d [1894]. Size 8½ × 7, pp. xii. and 335. *Map, Plans, and Illustrations. Price* 6*s*. *Presented by the Publishers.*

Although the aim of this book is rather historical than geographical, it contains valuable original maps prepared by Major P. W. Forbes.

Natal. **Russell.**

Natal, the Land and its Story : a Geography and History for the use of Schools. (With Map.) By Robert Russell. Third Edition. Pietermaritzburg, P. Davis & Sons, 1894. Size 7½ × 5, pp. 288 and ix. *Map. Presented by R. C. Russell, Esq.*

An outline of the geography and history of Natal, mainly intended for young people. A new chapter has been added to the present edition, and the work has been revised throughout.

North Africa—Berbers. **Brinton.**

The Alphabets of the Berbers. By Daniel G. Brinton. From the *Proceedings* of the Oriental Club of Philadelphia, 1894. Size 9 × 6, pp. 12. *Presented by the Author.*

South Africa. *M.V. Erdk. Leipzig*, 1893: 1–90. **Barthel.**

Völkerbewegungen auf der Südhälfte des afrikanischen Kontinents. Mit einer Karte. Von Dr. Karl Barthel.

An elaborate discussion of the movements of the native peoples of South Africa.

NORTH AMERICA.

Bering Sea—Seals. *B. American G.S.* **26** (1894): 326–372. **Brown.**

Fur Seals and the Bering Sea Arbitration. By J. Stanley Brown.

An exceedingly interesting account of the habits of the fur-seal, with arguments to show that the enactments of the Bering Sea Arbitration are insufficient to preserve the industry of fur-sealing on the islands of Bering Sea.

Bermuda Islands. **Kettle.**

A description of the Bermuda Islands and Reefs. To accompany the Chart. Fifteenth Edition. By William R. Kettle. London, R. H. Laurie, 1894. Size 8½ × 5½. *Presented by the Author.*

Mexico—Cave-Dwellers. *B. American G.S.* **26** (1894) : 299–325. **Lumholtz.**

The American Cave-Dwellers; the Tarahumaris of the Sierra Madre. By Carl Lumholtz.

United States. **Whitney.**

The United States : facts and figures illustrating the Physical Geography of the Country and its material resources. Supplement I. : Population, Immigration, Irrigation. By J. D. Whitney. Boston, Little, Brown & Co , 1894. Size 9½ × 6, pp. xxvii. and 324. *Presented by the Author.*

Mr. Whitney wrote the article 'United States' for the last edition of the 'Encyclopædia Britannica,' and as the limits of that work did not admit of his elaborate treatise being inserted in full, he published it as a separate book in 1890. The present volume is intended to supplement the book with the statistics of the census of 1890, and a considerable amount of additional matter. It thus completes and brings down to date the best general account of the geography of the United States with which we are acquainted.

United States—Indians. *Jahresb. G. Ges. Bern* 13 (1894): 23–106. **Kurz.**

Aus dem Tagebuch des Malers Friedrich Kurz über seinen Aufenthalt bei den Missouri-Indianern, 1848–1852. Bearbeitet und mitgeteilt von dem Neffen des Malers Dr. Emil Kurz, Privatdocent in Bern.

Friedrich Kurz, whose diary of travel is now published for the first time—twenty-three years after his death, and forty-two years after the close of the experiences which it relates—lived for four years west of the Mississippi almost exclusively with the Indians, and made good use of his skill as an artist in taking portraits and painting the conditions amongst which they lived. He also collected vocabularies of the Iowa language, and made many interesting observations which it is well to have on record.

United States—Indians. **James.**

Johns Hopkins University Studies. Twelfth Series. X. English Institutions and the American Indian. By James Alton James. Baltimore, Johns Hopkins Press, 1894. Size 9½ × 6, pp. 59.

A study of the condition of the North American Indians in the colonial period.

United States—Massachusetts. **Haynes.**

Johns Hopkins University Studies. Twelfth Series. VIII.-IX. Representation and Suffrage in Massachusetts, 1620–1691. By George H. Haynes. Baltimore, Johns Hopkins Press, 1894. Size 9½ × 6, pp. 90.

United States—North Carolina. **Bassett.**

Johns Hopkins University Studies. Twelfth Series. III. The Constitutional Beginnings of North Carolina (1663–1729). By John Spencer Bassett. Baltimore, Johns Hopkins Press, 1894. Size 9½ × 6, pp. 73.

CENTRAL AND SOUTH AMERICA.

Argentine—Mendoza. *B.A. nacional de Ciencias Cordoba* 13 (1894): 171–203. **Kurtz.**

Dos viajes botanicos al Rio Salado Superior (Cordillera de Mendoza) Ejecutados en los años, 1891–92 y 1892–93. Por Federico Kurtz.

An account of the plants along the upper course of the Salado in the pampas and on the mountain slopes.

Brazil—Immigration. *Cosmos* 11 (1892–93): 289–315. **Grossi.**

Contribuzioni allo studio dell' Emigrazione Italiana al Brasile, del dottor Vincenzo Grossi.

More than half a million Italian emigrants are at present living in Brazil, and after discussing the way in which they are distributed amongst the states, and their condition there, the author urges the importance of establishing a government office in Italy for the dissemination of necessary information to intending emigrants.

Chile—Andes. *Petermanns M.* 40 (1894): 145–155. **Steffen.**

Reiseskizzen aus den Cordilleren von Llanquihue. Von Dr. Hans Steffen in Santiago de Chile. *With Map.*

This journey was in the remarkable lake-district of the Cordillera, about lat. 41° S. and between long. 71° and 73° W.

Gran Chaco—Zamucos. *B.S.G. Italiana* 7 (1894): 466–510. **Boggiani.**

I Ciamacoco. Conferenza del Car. Guido Boggiani.

An account of the Zamucos tribe of South American Indians who inhabit the Gran Chaco. The paper is illustrated by a sketch-map, and a few drawings of native arms and ornaments.

Haiti. **Rouzier.**

Dictionnaire géographique et administratif universel d'Haïti illustré . . . ou Guide Général en Haïti. Par S. Rouzier. [Tome II. G–H.] Paris, Charles Blot [not dated (1894)]. Size 10 × 6½, pp. 402. *Map and Illustrations.*

This volume is mainly occupied with the article "Haiti."

Nicaragua—Mosquito Coast. *B. American G.S.* 26 (1894): 241–248. **Kalb.**

A Bibliography of the Mosquito Coast of Nicaragua. By Courtenay de Kalb.

This list of writings on Mosquitia will be very useful, as it appears to be fairly complete.

Peru. **Middendorf.**

Peru. Beobachtungen und Studien über das Land und seine Bewohner während eines 25-Jährigen Aufenthalts, von E. W. Middendorf. II. Band. Das Küstenland von Peru. Mit 56 Textbildern und 38 Tafeln. Berlin, Robert Oppenheim (Gustav Schmidt), 1894. Size 10 × 6½, pp. xii. and 424. *Price 12 marks. Presented by the Publisher.*

The first volume of this work recently published dealt with Lima, the capital city, and with the political condition of Peru. The second gives an account of the vicinity of Lima and of the coast of Peru to the north and to the south.

Uruguay—Shipwrecks. **Lussich.**

Celebrated Shipwrecks at Cape Polonio, off the English Bank, on the coasts of the Oriental Republic of Uruguay, and in the Atlantic Ocean. By Antonio D. Lussich. Fourth Edition. Translated by Henry C. Ayre, Monte Video, 1894. Size 9 × 6, pp. 462. *Chart and Plates. Presented by the Author.*

AUSTRALASIA.

Australia. *T.R.G.S. Australasia (Victoria)* 11 (1894): 65–119. **Hovell & Hume.**

Journal of Discovery to Port Phillip, New South Wales, in 1824 and 1825. By W. H. Hovell and H. Hume.

A reprint, with illustrations, of a work published at Sydney in 1837. The editors of the *Transactions* explicitly state that "the Council takes no responsibility for the statements contained in the above-named journal, or for the controversy which has arisen thereon. It is reprinted here as being the first published journal of an important Australian expedition."

Solomon Islands. *Globus* 66 (1894): 133–136. **Ribbe.**

Reise nach Bougainville (Salomonen). Von C. Ribbe.

Herr Ribbe spent some months in the Solomon Islands in the early part of this year, and had an opportunity of becoming acquainted with the natives of Bougainville Island.

Malay Archipelago—Lombok. *Globus* 66 (1894): 101–104. **Zondervan.**

Die Insel Lombok. Von H. Zondervan. Bergen-op-Zoom.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Fjord-structure. *Z. Ges. Erdk. Berlin* 29 (1894): 189–259. **Dinse.**

Die Fjordbildungen. Ein Beitrag zur Morphographie der Küsten. Von P. Dinse.

This paper, which deals with the general characteristics of fjords, will be separately noticed.

Globes. **Fiorini.**

Le Sfere cosmografiche e specialmente le sferi terrestri. Memoria del Socio M. Fiorini, professore all' Universita di Bologna. Rome, 1894. Size 9 × 6, pp. 92. *Presented by the Author.*

This is an elaborate work on the methods of representation adopted in the construction of a number of historical, celestial, and terrestrial globes, with the formulæ for the various projections employed in drawing the gores. The pamphlet is reprinted from the *Bolletino* of the Italian Geographical Society, vol. 7, 1894.

Land Forms. *Rev. G.* 36 (1894): 113–118, 200–209. **Thalamas.**

A Thalamas: Questions géographiques. Les procédés de description d'un relief avec application à une zone artificiellement limitée. Le département de l'Aisne.

M. Thalemas points out the great importance of employing an adequate terminology in describing the physical features of a region, although we fear the attempt to combine in the name of any place a conception of its geometrical, geological, and geographical relief which he claims as desirable, is scarcely practicable.

Meteorology. **Hann.**

Die tägliche Periode der Windstärke auf dem Sonnblickgipfel und auf Berggipfeln überhaupt von J. Hann. Aus den Sitzungsberichten der Kaiserl. Akademie der Wissenschaften in Wien. Mathem.-naturw.

Classe: Bd. CIII. Abth. II. a. Juli 1894. Vienna, 1894. Size 10 × 6½, pp. 72. *Presented by the Author.*

Meteorology. **Theophrastus.**

Theophrastus of Eresus on Winds and on Weather Signs. Translated, with an Introduction and Notes, and an Appendix on the direction, number, and nomenclature of the winds in Classical and later times, by Jas. G. Wood, and edited by G. J. Symons. London, Edward Stanford, 1894. Size 9×6, pp. 97. *Maps and Illustrations. Presented by G. J. Symons, Esq.*

Mr. Symons has here secured the publication of the views of Theophrastus on wind, giving a picture of the conception of a large part of physical geography in the mind of Aristotle's favourite pupil. As an appendix, there is a summary of the number, direction, and names of the winds mentioned in classical writings.

Oceanography. **Karstens.**

Eine neue Berechnung der mittleren Tiefen der Oceane nebst einer vergleichenden Kritik der verschiedenen Berechnungsmethoden, von Dr. Karl Karstens. Kiel, Lipsius and Tischer, 1894. Size 10 × 6½, pp. 32. Tables xxvii. *Presented by the Author.*

This criticism of the calculations of the mean depth of the ocean is summarized in the Monthly Record.

Oceanography. *J. Victoria I. (London)* 27 (1894): 48-62. **Hull.**

How the waters of the ocean became salt. By Prof. Edward Hull.

Professor Hull upholds the geological or "washing-out" theory of the origin of salt in ocean water.

Oceanography—Thermometer. *Rev. maritime et coloniale* **122** (1894): 204–211. **Thoulet.**

Étude du thermomètre plongeur de la Marine française. Par le Professeur J. Thoulet.

The deep-sea thermometer adopted by the French navy is a slow-action thermometer, the rate of change of temperature of which with time has been accurately determined, so as to be allowed for in making observations.

NEW MAPS.

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EUROPE.

England and Wales. **Ordnance Survey.**

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Greece. **Mitzopulos.**

Karte der mittel-griechischen Erdbeben von 1893 u. 1894. Von C. Mitzopulos. Geologisches kolorirt nach A. Bittner und F. Teller. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang, 1894, Tafel 15. Gotha, Justus Perthes. *Presented by the Publisher.*

London. **Stanford.**

New Map of the County of London. 20 sheets. Scale 4 inches to a stat. mile. London: E. Stanford. Price, coloured sheets, in portfolio, 16*s.* *Presented by the Publisher.*

This is an entirely new map of the County of London, drawn on the scale of four inches to one mile. It consists of twenty sheets, and extends to Barking and Cross Ness on the east, and includes the whole of the extra-metropolitan borough of West Ham. On the west, it embraces Ealing, Brentford, the whole of the borough of Richmond, and the greater part of the borough of Kingston; on the north, the hamlet of Highgate; and on the south, the hamlet of Penge, with the northern verge of Croydon. The parks and open spaces under the control of the London County Council are coloured dark green; other parks and open spaces are coloured light green. Main roads, omnibus and tramway routes, brown and water-blue. Levels are given in feet above sea, Ordnance datum; and the positions of board schools, hospitals, fire-brigade stations, and all public buildings are shown. The map is very nicely drawn, and evident care has been taken to bring it up to date.

Netherlands. **Graaf.**

Handelskaart van het Konenkrijk der Nederlanden op de schaal van 1 : 250,000 (or 3·9 statute miles to an inch) bevattende alle plaatsen voorkomende op de groote topografische kaart van het Ministerie van Oorlog, benevens alle middelen van vervoer. Uitgave van het Handelsinformatiebureau van der Graaf & Co., Rotterdam and Amsterdam. 4 sheets, with Index.

This is a useful general map of the inland navigation of Holland. The ocean lines of steamers which sail from the different ports are indicated, and some useful information with regard to navigation is given in the form of notes on the map.

ASIA.

Formosa. **De Villard.**

Map of Formosa. Scale 1 : 700,000 or 11 stat. miles to an inch. Drawn for the Imperial Chinese Government. R. A. de Villard, Inspectorate General of Customs. Shanghai, 1894. *Presented by R. A. de Villard, Esq.*

This map was prepared for the Chinese Government by Mr. de Villard. The names of places are written in both Chinese and English. Four insets of ports are given, but no soundings are shown.

Korea. **De Villard.**

Map of Korea. Scale 1 : 2,700,000 or 42·5 stat. miles to an inch. Drawn for the Imperial Chinese Government. R. A. de Villard, Inspectorate General of Customs. Shanghai, 1894. *Presented by R. A. de Villard, Esq.*

In this map, which has been prepared by Mr. de Villard for the Chinese Government, the names of the principal places are given in English and Chinese. High-roads and local roads are distinguished by the manner in which they are drawn, and frontiers and boundaries are laid down. Insets on an enlarged scale are given of Seoul, Yuensan, Fusan, and Jenchuan.

AFRICA.

Central Africa. **Hansen.**

Bassins du Haut-Nil et Moyen-Congo. Carte détaillée, treize feuilles, dressée par J. Hansen. 1893. Scale 1 : 1,750,000 or 11·9 stat. miles to an inch. Paris.

The area embraced in this map extends from the northern end of Lake Tanganyika on the south, to Khartum on the north, and from Yakoma on the west, to the country east of the White Nile. It has been compiled with great care from the most recent material, and shows routes of explorers. It has been produced on the scale of about twelve statute miles to an inch, and will therefore be a useful map for reference. Among other items of information given are notes on the nature and character of the country. An index plan of the map is given on each sheet.

Somaliland. **Menges.**

Josef Menges' Reisen auf das Hochplateau der Somali Halbinsel in den Jahren, 1884 und 1892. Nach den Itineraraufnahmen des Reisenden entworfen v. Dr. B. Hassenstein. Scale 1 : 300,000 or 4·7 stat. miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang, 1894, Tafel 16. Gotha, Justus Perthes. *Presented by the Publisher.*

AMERICA.

South America. **Payer.**

Orignalkarte des Rio Napo und Rio Curaray. Nach eigenen Aufnahmen in Dampfer "Putomayo," März bis Mai, 1890, Gezeichnet von Richard Payer. Mitglied der wissenschaftl. Komission von Peru (Gesetz v. 4 Nov. 1887). Scale 1 : 800,000 or 12·6 stat. miles to an inch. Gotha, Justus Perthes. Petermann's 'Geographische Mitteilungen,' Jahrgang, 1894, Tafel 13. *Presented by the Publisher.*

United States. **Rand, McNally & Co.**

Rand, McNally & Co.'s Indexed County and Township Pocket Maps and Shippers' Guide of Michigan (scales $\left\{\begin{matrix}1: 1,500,000\\1: 759,200\end{matrix}\right\}$ or $\left\{\begin{matrix}23\ 6\\11\ 9\end{matrix}\right\}$ stat. miles to an inch) and Indian and Oklahoma Territories (scale 1 : 750,000 or 24·0 stat. miles to an inch). Rand, McNally & Co., Chicago & New York, 1894. *Presented by the Publishers through E. Stanford, Esq.*

These are new editions of a series of maps published for the use of persons visiting the United States on business or for pleasure. They contain a large amount of useful information with regard to telegraph offices, railway routes, etc.

GENERAL.

Educational. **Pennesi.**

Atlante Scolastico per la geografia Fisica e Politica di Guiseppe Pennesi. Fascicolo II. Instituto Cartografico Italiano. Roma. Price 2.50 *li. Presented by the Publishers.*

The following are the contents of the present issue of this atlas:—Physical map of the Alps; physical map of Central Europe; political map of France; political map of the German Empire; map of Western Germany, Belgium and Holland; political map of Austro-Hungary; political and physical map of Spain and Portugal; political and physical map of the Balkan Peninsula; political and physical map of the British Isles; political and physical map of Norway, Sweden, and Denmark; political and physical map of European Russia. In addition to the principal maps, several insets are given, together with explanatory notes with regard to the system of colouring employed. Heights of the land above sea-level, and the depths of the sea, are given in metres. The maps have all been produced in a remarkably clear style, and over-crowding with names has been avoided.

CHARTS.

Admiralty Charts. **Hydrographic Office.**

Charts that have received Important Corrections.

No. 1170A England, west coast:—Holyhead to Great Ormes Head. 121, Baltic Sea:—Koster Islands and approaches to Strömstad. 1588, Mediterranean:—Anchorage on south coast of Spain. 150, France, south coast:—Marseille port and road. 2234, Black Sea:—Sheet 5, Sea of Azov. 1692, Africa, north coast:—Anchorages on the coast of Morocco.

8D Red Sea:—Sheet 4. 919, Gulf of Aden:—Obokh, Berbera, Zeila anchorage. 2662, Sulu Sea:—Ports in Makassar Strait. 2347, Japan:—Nipon, Kiusiu, and Sikok, and part of the Korea. 2405, North Pacific:—Kuril islands from Nipon to Kamchatka. 2432, Russian Tartary:—Tumen Ula to Strelok bay. 981, North Pacific Ocean, Caroline Islands:—Seniavina Islands. 988, Pacific:—Marshall Islands, Ebon and Arhno atolls.

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North Atlantic. **Rung.**

Répartition de la Pression Atmosphérique sur l'Océan Atlantique Septentrional d'après les observations de 1870 a 1889, avec la direction moyenne du vent sur les littoraux. Par le Capitaine G. Rung, sous-directeur de l'Institut Météorologique de Danemark. Aux frais de la Fondation Carlsberg. Copenhague: Depot des Cartes de la Marine Royale (Det Kongelige Sökaart-Archiv), 1894.

This atlas contains a series of charts on which are shown mean barometric pressure over the North Atlantic for the whole year, and for each month, together with the mean direction of the wind, which is indicated by arrows. At the end of the atlas is given a series of diagrams illustrating the variations of barometric pressure in different latitudes and longitudes in the North Atlantic. In the accompanying letterpress the author gives some valuable meteorological tables and explanatory notes with reference to the compilation of the charts.

N. Atlantic and N. Pacific Oceans. **U.S. Hydrographic Office.**

Pilot Charts of North Atlantic Ocean of August and September, 1894, and of North Pacific Ocean for September and October, 1894. Published at the Hydrographic Office, Bureau of Navigation, Washington, D.C. Charles D. Sigsbee, Commander U.S. Navy, Hydrographer. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Beira Railway. **Eckersley.**

37 Photographs of the Beira Railway and neighbouring country. Taken by W. A. Eckersley, Esq. *Presented by W. A. Eckersley, Esq.*

Among this set of photographs there are some excellent views of Mashuna dwellings, and it also contains some very good types of natives, while the views of the country are well chosen to convey a good idea of its general appearance.

South East Africa. **Melvill.**

19 Photographs of Swaziland, Lorenzo Marques, Johannesburg, etc., South-East Africa. *Presented by Edwd. H. V. Melvill, Esq., A.M.I.C.E.*

Six of these platinotypes were taken by Mr. Melvill during July and August last, and the remaining thirteen were bought at Johannesburg. They are all good specimens of photography.

Somaliland. **Swayne.**

41 Photographs of Natives and Scenery of Somaliland, by Capt. H. G. C. Swayne, R.E. *Presented by Capt. H. G. C. Swayne, R.E.*

As visits to Somaliland are now becoming much more frequent, this series of photographs will, no doubt, have a special interest for those whose friends have travelled or are about to travel in that country. The subjects and views are well chosen, and the photographs form a welcome addition to the Society's collection.

West Africa. **Lang.**

18 Photographs of the West Coast of Africa (Gold Coast, Sierra Leone, etc.). Taken by Capt. J. I. Lang, R.E. *Presented by Capt. J. I. Lang, R.E.*

This is a set of photographs taken by Capt. J. I. Lang, R.E. Among them is a very good view of Sierra Leone taken from the sea, types of natives, and incidents of travel on the west coast of Africa.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

Turner & Shawe, *43 Brewer Street, Regent Str. W.*

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